



# Minimum Activities for Mothers and Newborns

## MotherNewBorNews

**Volume 2**

**Issue 1**

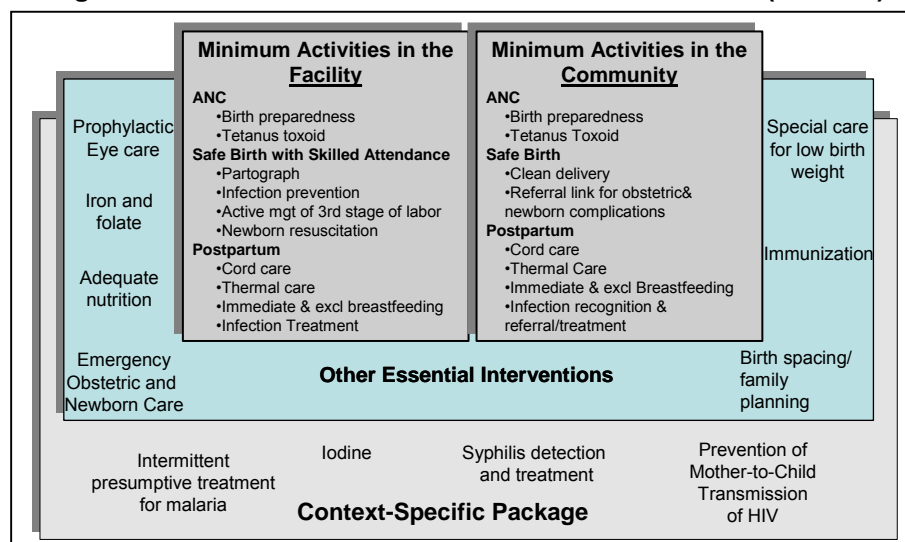
**Section I:  
Description of MAMAN (Minimum Activities for Mothers and Newborns)**

**Minimum Activities for Mothers and Newborns (MAMAN):  
Introduction by Michel Pacqué**

It is now evident that the well-being of newborns and children cannot be ensured ignoring the health and well-being of the mothers. Mothers, newborns, and children all can benefit from a functioning health system providing interventions throughout the continuum of care from pre-pregnancy through pregnancy, childbirth, and the postnatal period, into infancy and childhood. Recent recognition of this mutual benefit has prompted a shift from MCH to MNCH (Maternal, Neonatal, and Child Health). To respond to this change, the CORE Safe Motherhood and Reproductive Health Working Group, CSTS+, and USAID have reviewed the Essential Maternal and Newborn Interventions as defined in the previously developed Technical Reference Materials (TRMs) and selected a package of Minimum Activities for Mothers and Newborns (MAMAN) with a special focus on maternal and newborn health interventions to guide Non Governmental Organization (NGO) programming.

The MAMAN framework comprises evidence-based interventions, which are grouped under four categories. The first category includes minimum activities that should be delivered in the facilities. The second group outlines minimum activities to be delivered in the community. The third and fourth group lists a number of other essential interventions and context-specific interventions for mother and newborn, which can be implemented in situations where the MAMAN interventions are already being addressed by other organizations and/or the PVO may have additional resources to devote to maternal, newborn and child (MNC) interventions.

**Figure 1: Minimum Activities for Mothers and Newborns (MAMAN)**



There were certain issues that were taken into account while developing the MAMAN framework. The evidence-based interventions were prioritized on the basis of level of impact on maternal and neonatal mortality and morbidity, core competencies and capacity to successfully implement the interventions in resource-constrained settings, feasibility of implementation, and priority interventions of other health program areas under the Child Survival and Health Grant Program (CSHGP) by USAID.

It is hoped that the MAMAN framework as illustrated in figure 1 will provide more consistency across programs leading to greater program impact on reducing mortality and morbidity of mothers and newborn. The group, which developed MAMAN, has also identified a core set of indicators to track and report on the progress of the minimum package of newborn interventions. Indicators will capture information in the area of Tetanus Toxoid immunization, skilled attendance, clean cord care, active management of third stage of labor, drying and wrapping, breastfeeding, postnatal visit of mother and newborns.

For information on MAMAN, please visit: <http://www.childsurvival.com/documents/usaaid.cfm>  
Or, please contact: Michel Pacqué <Michel.C.Pacque@orcmacro.com>

## Evidence for interventions included in the Minimum Package of Maternal and Newborn Interventions by Malay Kanti Mridha

In 2006, USAID and several of its partners agreed to the implementation of a minimum set of evidence-based interventions in maternal and newborn programs. These included a number of community-based and facility-based interventions that could be phased in to improve the survival and well being of mothers and newborns. These interventions have been tested in various operations research studies and have also been provided as an integrated package of services as described in subsequent sections of this newsletter. Below is a summary of evidence for each of the interventions. In the interest of brevity and simplicity, we have limited the evidence to just a few key studies. To keep the document consistent with the MAMAN framework described in the previous article, the evidence for MAMAN interventions has been described under three broad categories: I) Minimum maternal and newborn care, II) Other essential interventions, and III) Context specific interventions.

### I) Minimum Maternal and Newborn care

#### A. Birth Preparedness:

In settings with limited resources, The World Health Organization (WHO) supports implementation of 'birth preparedness' or 'birth plans', with the objective of reducing maternal and perinatal mortality. Birth preparedness aims at increasing awareness of danger signs, reducing the delays in receiving skilled care and improving intra-family communications and relations with providers. Birth preparedness may also include identification of the closest appropriate care facility, funds for birth-related and emergency expenses, locating transportation, and identifying compatible blood donors in case of emergency<sup>1</sup>. Little empirical evidence exists to examine the effectiveness of these interventions, and existing studies are flawed due to small scale and sample design; nevertheless, a recent cluster-randomized trial in Nepal showed a 30 percent reduction in neonatal mortality and a 75 percent reduction in maternal mortality in communities where some components of the birth preparedness plan were implemented. These included group discussions facilitated by local female facilitators to activate, strengthen and support community groups of pregnant women, community-generated funds for maternal or infant care, production and distribution of clean delivery kits, home visits by community group members to newly pregnant mothers, and information about perinatal health<sup>2</sup>.

#### B. Tetanus Toxoid:

Available evidence supports the implementation of immunization practices on women of childbearing age or pregnant women in communities. Studies found that effectiveness of a single dose of TT in preventing neonatal tetanus deaths is 43 percent. With a two or three doses course, vaccine

<sup>1</sup> Mario SD et al. what is the effectiveness of antenatal care. Supplement of The World Health Organization. December 2005.

<sup>2</sup> Manandhar DS et al. Effect of a participatory intervention with women's groups on birth outcomes in Nepal: cluster-randomized controlled trial. The Lancet, 2004, 364:970–979.

effectiveness is 98 percent<sup>3</sup>. In another study, TT vaccination was given to pregnant women who had received two doses in the preceding three years as a single booster dose. Women with no previous history of TT immunization or who were previously only partially immunized were given two doses at one-month intervals. This study demonstrated that neonatal tetanus prevention attributable to TT vaccine was 88 percent for complete immunization and 59 percent for partial immunization compared to women without immunization<sup>4</sup>.

### C. Partograph:

The WHO recommends that the provider uses the partograph for women giving birth in maternal care facilities. One study in Indonesia assessed the effectiveness of promoting the use of the WHO partograph by midwives for labor in a maternity home by comparing outcomes after birth. The study found that partographs were correctly completed in 92 percent cases. The use of the partograph significantly increased the referral rate, and reduced the number of vaginal examinations, Oxytocin use and obstructed labor. The proportions of caesarean section deliveries and prolonged labor were not significantly reduced. Apgar scores of less than 7 at 1 minute were reduced significantly, whereas Apgar scores at 5 minutes and requirement for neonatal resuscitation were not significantly different<sup>5</sup>. Another article<sup>6</sup> reported that labor surveillance including the partograph can reduce 40 percent of early neonatal deaths.

### D. Clean Delivery and Infection Prevention:

The Lancet neonatal series reported that clean delivery practices can result in reduction of neonatal mortality or morbidity by 58-78 percent and of incidence of neonatal tetanus by 55-99 percent<sup>6</sup>. A recent study from Tanzania indicated that the use of a clean home delivery kit coupled with an educational intervention about the six 'cleans' (i.e. clean hands, clean perineum, clean delivery surface, clean cord cutting and tying instruments, clean cutting surface) had a significant effect on reducing the incidence of cord infection and puerperal sepsis among women enrolled in the study. The study also found that women who bathed before delivery were less likely to develop puerperal sepsis than a woman who did not bath before delivery, and a newborn of a woman who bathed before delivery was less likely to develop cord infection than a newborn of a woman who did not bathe before delivery. While bathing before delivery had about the same independent effect on puerperal sepsis as kit use, the added benefit of the kit is that it also helps reduce cord infection<sup>7</sup>. Similar studies from Nepal also reported that use of a clean delivery kit reduces simple cord infection, neonatal tetanus and neonatal sepsis, when compared with deliveries done using unclean instruments for cutting the cord and unclean cutting surfaces. The study recommended that in addition to providing clean cutting materials, better hand washing practices might also be promoted<sup>8</sup>.

Other available community-based data suggest that the best gains may be obtained from implementation of a combination of maternal immunization and clean delivery (six 'cleans') practices. Therefore, behavior-change communications strategies to promote clean delivery practices including clean cord cutting should be implemented in tandem with introduction of clean delivery kits<sup>9</sup>. However, practice of six 'cleans' should always be performed even if commercial packets of clean delivery kits are unavailable.

<sup>3</sup> Demicheli V, Barale A, Rivetti A. Vaccines for women to prevent neonatal tetanus. Cochrane Database of Systematic Reviews 2005, Issue 4. Art. No.: CD002959. DOI: 10.1002/14651858.CD002959.pub2.

<sup>4</sup> Gupta SD, Keyl PM. Effectiveness of prenatal tetanus toxoid immunization against neonatal tetanus in a rural area in India. *Pediatr Infect Dis J*. 1998;17:316–321.

<sup>5</sup> Fahdhy M, Chongsuivatwong V. Evaluation of World Health Organization partograph implementation by midwives for maternity home birth in Medan Indonesia. *Midwifery*. 2005 Dec; 21(4):301-10.

<sup>6</sup> Darmstadt GL et al. Evidence-based cost-effective interventions: how many newborn babies can we save? *The Lancet Neonatal survival series*; March 2005

<sup>7</sup> Moshia F, Winani S, Wood S, Changalucha J, Ngasalla B. Evaluation of the effectiveness of a clean delivery kit intervention in preventing cord infection and puerperal sepsis among neonates and their mothers in rural Mwanza Region, Tanzania. *Tanzan Health Res Bull*. 2005 Sep;7(3):185-8.

<sup>8</sup> Beun M, Wood S. Acceptability and use of clean home delivery kits in Nepal: a qualitative study. *Journal of Health and Popular Nutrition*. 2003;21(4):367–73.

<sup>9</sup> Zulfiqar A, Bhutta, Gary L, Darmstadt, Babar S, Hasan and Rachel A. Haws. Outcomes in Developing Countries: A Review of the Evidence Community-Based Interventions for Improving Perinatal and Neonatal Health. *Pediatrics* 2005;115; 519-617

### E. Active Management of Third Stage of Labor:

Active Management of Third Stage of Labor (AMTSL) consists of three components: a) administration of a uterotonic drug (oxytocin or misoprostol, oxytocin being the drug of choice) within one minute of birth of the baby, b) Controlled cord traction to assist with prompt delivery of the placenta, and c) massaging the uterus after the delivery of placenta. Effectiveness of AMTSL in reducing the incidence of postpartum hemorrhage (PPH) [defined as more than or equal to 500 ml per vaginal blood loss in postpartum period] and the need for PPH treatment has been investigated by a number of large trials. The Hinchingsbrooke<sup>10</sup> randomized control trials provided evidence that AMTSL significantly reduces postpartum hemorrhage, decreases blood loss, and decreases the need for blood transfusions. Findings from a WHO multi-center study indicated that 10 IU oxytocin (intravenous or intramuscular) is preferable to 600 microgram of oral misoprostol in the AMTSL in hospital settings where active management is the norm<sup>11</sup>. One recently published study in Vietnam found that AMTSL was associated with reduced risks for prolonged third stage beyond 30 minutes, supplemental oxytocin, and bimanual compression. When cases with first stage oxytocin augmentation were excluded, AMTSL was associated with a 34 percent reduction in PPH incidence<sup>12</sup>. Although a WHO multicenter trial concluded that, in hospital settings, oxytocin is preferable to misoprostol in AMTSL<sup>13</sup>, in home births without a skilled attendant, misoprostol may be the only technology available to control PPH. The safety and efficacy of misoprostol as an alternative to oxytocin is now well documented. A study in a university teaching hospital in England demonstrated that giving misoprostol to women immediately after childbirth resulted in significantly lower rates of PPH than when the third stage of labor was managed only through controlled cord traction and rubbing the uterus<sup>14</sup>. Studies also found that 18 percent of women would experience PPH if the placenta were delivered on its own, 2.7 percent if oxytocin were used, and 3.6 percent if misoprostol were used<sup>14,15</sup>. A recent study from India provided evidence that oral misoprostol was associated with about 50 percent reduction (from 12.0 percent to 6.4 percent) in the rate of acute postpartum hemorrhage and mean blood loss<sup>16</sup>. In light of recent evidence, WHO recommends that AMTSL should be practiced only by skilled providers due to the risk of inversion of uterus during controlled cord traction and that, in the absence of active management of the third stage of labour, a uterotonic drug (oxytocin or misoprostol) should be offered by a health worker trained in its use for prevention of PPH<sup>17</sup>.

### F. Referral Link for Obstetrics and Newborn Complications:

It is widely accepted that substantial reductions in maternal and neonatal mortality and morbidity are impossible to achieve without a functional system for early detection of complications and referral to higher facilities. The goal of a referral system is to ensure that patients are managed in an appropriate level facility at the minimum of cost.

Experience from Mother Care Projects in Guatemala and Indonesia revealed that referral practices by TBAs can be improved and this can result in reduction of maternal and neonatal mortality<sup>18</sup>. A WHO collaborative study found that home-based maternal records can be helpful in early identification of risk factors both before and after pregnancy, referrals of at-risk persons, initiation of care, registration of mothers and infants at health centers, vaccination with Tetanus Toxoid, and provision of useful health information and continuity of care<sup>19</sup>. Another study in Pakistan explored the association of time of

<sup>10</sup> Rogers J, Wood J, McCandlish R, Ayers S, Truesdale A, Elbourne D. Active versus expectant management of third stage of labor: the Hinchingsbrooke randomized controlled trial. *Lancet*. 1998; 351:693–699.

<sup>11</sup> Gulmezoglu AM et al. WHO multicentre randomised trial of Misoprostol in the management of the third stage of labor. *Lancet*. 2001 Sep 1;358(9283):689–95.

<sup>12</sup> Tsu VD et al. Reducing postpartum hemorrhage in Vietnam: assessing the effectiveness of active management of third-stage labor. *J Obstet Gynaecol Res*. 2006 Oct;32(5):489–96

<sup>13</sup> Gulmezoglu AM et al. 2001. WHO multicentre randomised trial of misoprostol in the management of the third stage of labour. *Lancet* 358(9283): 689– 695.

<sup>14</sup> El-Refaey H et al. 2000. The misoprostol third stage of labor study: A randomised controlled comparison trial between orally administered misoprostol and standard management. *The British Journal of Obstetrics and Gynaecology*: 107: 1104–1110.

<sup>15</sup> Prendiville WJ et al. 1988. The Bristol third stage trial: Active versus physiological management of third stage of labour. *British Medical Journal* 297(6659):1295–1300.

<sup>16</sup> Derman RJ et al. Oral misoprostol in preventing postpartum haemorrhage in resource-poor communities: a randomised controlled trial. *Lancet* 2006; 368: 1248–53

<sup>17</sup> The World Health Organization. WHO recommendations for the prevention of postpartum hemorrhage. 2007

<sup>18</sup> Kwast BE. Reduction of maternal and perinatal mortality in rural and peri-urban settings: what works? *Eur J Obstet Gynecol Reprod Biol*. 1996 Oct;69(1):47–53

<sup>19</sup> Shah PM et al. Evaluation of the home-based maternal record: a WHO collaborative study. *Bull World Health Organ*. 1993;71(5):535–48

referral of asphyxiated newborns with the outcome and revealed that asphyxiated newborns who reached a tertiary care hospital earlier had significantly better outcomes as compared to those who arrived late (mortality was 24 percent in the early referred group compared to 76 percent in late referred group). Early recognition of birth asphyxia and referral, therefore, reduces morbidity and mortality<sup>20</sup>.

### G. Newborn Resuscitation:

The World Health Organization (WHO) defines birth asphyxia as failure to initiate and sustain breathing at birth. It is the third major cause of neonatal death—after infections and preterm births—in developing countries and accounts for an estimated 23 percent of the annual 4 million neonatal deaths. A hospital-based study<sup>21</sup> in Uganda found that birth asphyxia is not associated with socio-demographic factors. The study also found that antepartum hospitalization, antepartum or intrapartum anaemia, antepartum hemorrhage and severe pre-eclampsia/eclampsia were significantly associated with birth asphyxia. Moreover, augmentation of labour with Oxytocin, premature rupture of membrane, meconium staining of liquor, vacuum extraction, caesarean section, low birth weight and malpresentations were also found to be significantly associated with birth asphyxia.

When done correctly, newborn resuscitation can revive more than three-quarters of newborns with birth asphyxia. It consists of three basic tasks: maintaining or ensuring body temperature control, clearing the airways, and inflating the lungs with air. Only in some circumstances are chest compressions or drugs needed to stimulate blood circulation. The recent Lancet neonatal series classified newborn resuscitation as an intervention “effective in reducing perinatal or neonatal mortality, or primary determinants thereof, but there is lack of data on effectiveness in large-scale program conditions.” The authors of the series estimated that there would be a 6 – 42 percent reduction in all causes of neonatal mortality if programs implemented newborn resuscitation<sup>22</sup>.

Studies from India and Indonesia suggest that neonatal resuscitation can be implemented in community settings. A study<sup>23</sup> from India found that home-based neonatal resuscitation delivered by a team of a Traditional Birth Attendant (TBA) and a semi-skilled village health worker could reduce the asphyxia related neonatal mortality by 65 percent compared to a TBA only. The study in Indonesia revealed that eighty-five percent of the cases of birth asphyxia could be successfully managed by community midwives as indicated by newborn survival. Seventy percent of the asphyxiated babies could be resuscitated by using tactile stimulation and/or appropriate positioning of the head and maintenance of warmth only and did not require use of the tube and mask. There was a statistically significant (47 percent) decrease in the birth asphyxia specific neonatal mortality rate (NMR) from 5.1 per 1,000 live births in 2003 to 2.7 per 1,000 live births in 2004. Overall, NMR decreased by 40 percent from 15 per 1,000 live births to 9 per 1,000 live births<sup>24</sup>.

In a certain proportion of babies suffering from birth asphyxia, use of neonatal resuscitation devices is crucial to save lives. There are many basic neonatal resuscitation devices available on the market, making it difficult for program managers and/or skilled birth attendants to select the device that best meets their needs given the available resources. To assist programs in making an informed decision on the type of resuscitation equipment to purchase, PATH/Healthtech evaluated 11 of the currently available resuscitators that included ‘a reusable bag and mask’ and ‘tube and mask devices’. Information in their evaluation included device features, valve parameters, cleaning-effectiveness, disinfection-durability of device, completeness of user instruction, ease of use, perceived comfort, and ease and completeness of disassembly and reassembly. All the devices were found to meet international standards for inspiratory and expiratory resistance, provide more than 200 compressions per minute, and be cleaned in less than 30 seconds. More detailed results including cost of resuscitation devices are provided in the Healthtech/PATH and USAID supported publication entitled “Practical selection of neonatal resuscitator: a field guide,” which can be downloaded from their website: [http://www.path.org/files/TS\\_nnr\\_guide.pdf](http://www.path.org/files/TS_nnr_guide.pdf)

<sup>20</sup> Sultan T. Does early referral to tertiary care decrease the mortality related to birth asphyxia? *J Coll Physicians Surg Pak*. 2006 Mar;16(3):220-2

<sup>21</sup> Kave D. Antenatal and intrapartum risk factors for birth asphyxia among emergency obstetric referrals in Mulago Hospital, Kampala, Uganda. *East Afr Med J*. 2003 Mar;80(3):140-3.

<sup>22</sup> Gary Darmstadt et al, 2005. Evidence-based, cost-effective interventions: how many newborn babies can we save? *Lancet Neonatal Series*. March 2005.

<sup>23</sup> Bang A T et al. Management of Birth Asphyxia in Home Deliveries in Rural Gadchiroli: The Effect of Two Types of Birth Attendants and of Resuscitating with Mouth-to-Mouth, Tube-Mask or Bag-Mask. *Journal of Perinatology* 2005; 25:S82–S91

<sup>24</sup> PATH. Reducing Birth Asphyxia Through the Bidan di Desa Program in Cirebon, Indonesia: Final Report Submitted by Program for Appropriate Technology in Health (PATH) to Save the Children US. Jakarta, Indonesia: PATH. March 15, 2006

## H. Cord Care:

Currently there is no conclusive evidence on the effectiveness of an antiseptic application to the umbilical cord versus dry cord care in all types of settings. A Cochrane review<sup>25</sup> on different methods of neonatal cord care, including the use of topical antimicrobials, suggested that the incidence of cord infection and skin infections within 6 weeks of observation was not affected by use of antiseptics though there was a trend toward reduced microbial colonization with the use of antimicrobials compared with no treatment. A review<sup>26</sup> by WHO in 1998 recommended dry cord care along with the use of soap and water solution to clean the cord when visibly soiled. The document notes that in environments with harmful practices or high risk of infection the use of an antiseptic may be appropriate.

A recently conducted community-based, cluster-randomised trial in Nepal provides supportive evidence of this recommendation and a second trial is underway to validate these findings. The Nepal trial compared outcomes of use of 4.0 percent Chlorhexidine on cord, cleansing of cord with soap and water, and dry cord care. The study found that frequency of severe infection of cord was reduced by 75 percent in Chlorhexidine group compared with dry cord-care group. Neonatal mortality was 24 percent lower in the Chlorhexidine group than in the dry cord care group. In infants enrolled within the first 24 hours, mortality was reduced by 34 percent in the Chlorhexidine group. Soap and water did not reduce infection or mortality risk<sup>27</sup>. Data from the same study demonstrated that risk of infection of cord was 29 percent and 62 percent higher in infants receiving topical cord applications of mustard oil and other potentially unclean substances, respectively. Skin-to-skin contact and hand washing by birth attendants and caretakers of newborns can reduce the risk of infections<sup>28</sup>. Another publication<sup>29</sup> from the same study reported that the mean separation time of umbilical cord was shorter in dry cord care (4.24 days) and soap/water (4.25 days) clusters than in Chlorhexidine clusters (5.32 days; mean difference: 1.08 days). Cords of infants who received Chlorhexidine were 3.6 times more likely to separate after seven days and separation time was not associated with cord infection. The study recommended that in addition to topical antiseptics, simple, low-cost interventions such as hand washing, skin-to-skin contact, and avoiding unclean cord applications should be promoted by community-based health workers.

## I. Thermal Care:

Hypothermia in the newborn period is widely regarded as a major contributory cause of morbidity in developing countries. Hypothermia is associated with increased risk of infections, coagulation defects, acidosis, delayed fetal-to-newborn circulatory adjustment, hyaline membrane disease, brain hemorrhage and neonatal cold injury. The risk of hypothermia is particularly marked among low birth weight (LBW) babies in developing countries even in countries with tropical climates.

Bathing of newborn immediately after birth is a common practice in developing countries. A study<sup>30</sup> in Uganda reported that bathing of newborns in the first hour after delivery resulted in a significantly increased prevalence of hypothermia, defined as temperature <36.5 degree Celcius, at 70 and at 90 minutes postpartum despite using warm water and skin to skin contact. This information supports WHO recommendation that bathing be delayed for at least 6 hours after birth to minimize the risk of cold stress during the period of maximum physiologic transition for the newborn.

Accepted ways to achieve optimal thermal control of the newborn include warming of the room, immediate drying and wrapping after birth, immediate and frequent breastfeeding, delay in bathing until the infant is physiologically stable, close contact with the mother such as skin-to-skin contact, and appropriate swaddling and dressing, including the use of a head cover.

<sup>25</sup> Zupan J, Garner P. Topical umbilical cord care at birth. *Cochrane Database Syst Rev*. 2000;CD001057

<sup>26</sup> World Health Organization. *Care of the Umbilical Cord: A Review of the Evidence*. Geneva, Switzerland: World Health Organization; 1998

<sup>27</sup> Mullany LC et al. Topical applications of chlorhexidine to the umbilical cord for prevention of omphalitis and neonatal mortality in southern Nepal: a community-based, cluster-randomised trial. *Lancet* 2006; 367: 910–18

<sup>28</sup> Mullany LC et al. Risk Factors for Umbilical Cord Infection among Newborns of Southern Nepal. *Am J Epidemiol*. 2007 Jan 15;165(2):203-11. Epub 2006 Oct 25.

<sup>29</sup> Mullany LC et al. Impact of umbilical cord cleansing with 4.0% Chlorhexidine on time to cord separation among newborns in southern Nepal: a cluster-randomized, community-based trial. *Pediatrics*. 2006 Nov;118(5):1864-71

<sup>30</sup> Bergstrom A. The impact of newborn bathing on the prevalence of neonatal hypothermia in Uganda: a randomized, controlled trial. *Acta Paediatr*. 2005 Oct;94(10):1462-7.

An earlier study<sup>31</sup> in India demonstrated that application of corn oil to preterm infants at four hour intervals significantly reduced the need for an external source of heat to maintain normal body temperature. Further studies on this are needed. Plastic wraps or bags, skin-to-skin care and transwarmer mattresses were all effective at keeping preterm babies warm in hospital settings as suggested by a recent Cochrane review<sup>32</sup>. During neonatal transport, a simple Styropor box showed promise for preventing hypothermia.

Kangaroo Mother Care (KMC) has also proven effective for thermal care of the baby. KMC is the early, prolonged and continuous skin-to-skin contact (STSC) between a care-giver (e.g., mother) and newborn in which the newborn is secured in a vertical position to the care-giver's chest by means of cloth, shawl or a specially designed kangaroo pouch. The effectiveness from KMC at the facility and community levels can be seen from a number of studies conducted at different settings around the world. At facility levels, when compared to babies given incubator care, babies given KMC showed reduced risk of nosocomial infection<sup>33</sup>, reduced risk of severe illness e.g., apnea, aspiration pneumonia, septicemia, lower respiratory tract illness<sup>34</sup>; more effective and faster rewarming<sup>35</sup>; quicker achievement of cardio-respiratory stability<sup>36</sup>; higher blood oxygenation levels<sup>37</sup>; increase of exclusive breastfeeding at discharge<sup>38</sup>, increased bonding between mother and neonates<sup>39</sup> and maternal sense of competence<sup>40</sup>. KMC managed babies had better weight gain, earlier hospital discharge and, more impressively, higher exclusive breast-feeding rates<sup>41</sup>. A community-based study in rural Uttar Pradesh, India found that STSC can ensure thermal care for the babies and is highly acceptable in rural areas when introduced through appropriate cultural paradigms<sup>42</sup>.

### J. Immediate and Exclusive Breastfeeding:

A wide variety of benefits of breastfeeding have been well documented, including reduced risk of hypothermia, hypoglycemia, necrotizing enterocolitis, omphalitis, acute respiratory infections (ARIs), diarrhea, and septicemia. Several studies have effectively demonstrated reduced rates of morbidity and mortality in early infancy with exclusive breastfeeding in community settings in developing countries. A review of studies<sup>43</sup> concluded that early and exclusive breastfeeding played an important role in reducing neonatal mortality, particularly after the first week of life. The WHO multicountry pooled analysis<sup>44</sup> again indicated that those infants < 2 months old who were not breastfed had significantly higher mortality (5.8 times) due to infectious diseases than breastfed infants. A study<sup>45</sup> from Ghana found a marked dose response of increasing risk of neonatal mortality with increasing delay in initiation of breastfeeding from 1 hour to day 7; overall late initiation (after day 1) was associated with a 2.4-fold increase in risk. The size of this effect was similar when the model was refit excluding infants at high risk of death (unwell on the day of birth, congenital abnormalities, premature, unwell at the time of interview) or excluding deaths during the first week (days 2–7) of life. The study also estimated that 16

<sup>31</sup> Fernandez A, Patkar S, Chawla C, Taskar T, Prabhu S. Oil application in preterm babies, a source of warmth and nutrition. *Indian Pediatr.* 1987;24:1111–1117

<sup>32</sup> McCall EM et al. Interventions to prevent hypothermia at birth in preterm and/or low birthweight babies. *Cochrane Database Syst Rev.* 2005 Jan 25;(1):CD004210.

<sup>33</sup> Kambarami, R.A., O. Chidede, and D.T. Kowo, Kangaroo care versus incubator care in the management of well preterm infants—a pilot study. *Ann Trop Paediatr.* 1998. 18(2): p. 81-6.

<sup>34</sup> Conde-Agudelo, A., J.L. Diaz-Rossello, and J.M. Belizan, Kangaroo mother care to reduce morbidity and mortality in low birthweight infants. *Cochrane Database Syst Rev.* 2003(2): p. CD002771.

<sup>35</sup> Christensson, K., et al., Randomised study of skin-to-skin versus incubator care for rewarming low-risk hypothermic neonates. *Lancet.* 1998. 352(9134): p. 1115

<sup>36</sup> Fischer C. et al. Cardiorespiratory stability of premature boys and girls during kangaroo care. *Early Human Development.* 1998,21:264.

<sup>37</sup> D. Acolet., K. Sleath, and A. Whitelaw, Oxygenation, heart rate and temperature in very low birthweight infants during skin-to-skin contact with their mothers. *Acta Paediatr Scand.* 1989. 78(2): p.189-93.

<sup>38</sup> N. Charpak, J.G Ruiz-Pelaez and Y. Charpak Rey-Martinez kangaroo Mother Program: An Alternative Way of Caring for Low Birth Weight Infants? One Year mortality in a Two Cohort Study. 1994; 94 pg 804-810

<sup>39</sup> D. Affonso, E. Bosque et al., Reconciliation and healing for mothers through skin-to-skin contact provided in an American tertiary level intensive care nursery. *Neonatal Netw.* 1993. 12(3): p.25-32.

<sup>40</sup> R. Tessier, M. Cristo, et al., Kangaroo mother care and the bonding hypothesis. *Pediatrics.* 1998 102(2):p.17.

<sup>41</sup> Ramanathan, K. Paul, V. K. et al. Kangaroo Mother Care in very low birth weight infants. *Indian J Pediatr* 2001 Nov;68(11):1019-23.

<sup>42</sup> Darmstadt G L et al. Introduction of community-based skin-to-skin care in rural Uttar Pradesh, India. *Journal of Perinatology* (2006) 26, 597–604. doi:10.1038/sj.jp.7211569; published online 17 August 2006

<sup>43</sup> Huffman S, Zehner E, Victora C. Can improvements in breast-feeding practices reduce neonatal mortality in developing countries? *Midwifery.* 2001;17:80–92

<sup>44</sup> WHO Collaborative Study Team on the Role of Breastfeeding on the Prevention of Infant Mortality. Effect of breastfeeding on infant and child mortality due to infectious diseases in less developed countries: a pooled analysis [published correction appears in *Lancet.* 2000;355:1104]. *Lancet.* 2000;355:451–455

<sup>45</sup> Edmond K M et al. Delayed Breastfeeding Initiation Increases Risk of Neonatal Mortality. *Pediatrics* 2006;117;380-386

percent of neonatal deaths could be prevented if all infants were breastfed from day 1 and 22 percent if breastfeeding started within the first hour.

### **K. Treatment of Newborns Infection:**

Newborn infections include septicemia, pneumonia, meningitis, conjunctivitis, candidiasis, cord infection, skin pustules, and diarrhea among others. Globally 1,280,000 neonatal deaths occur annually due to neonatal sepsis. There are significant regional differences in pathogens causing neonatal sepsis. Community-based treatment for neonatal sepsis was first implemented as part of a study<sup>46</sup> in rural India. In the study, female village health workers were trained to treat sepsis in newborns with injection of gentamicin and oral tablets of cotrimoxazole, administered twice daily for seven days. Other components of essential neonatal care were provided e.g. clean delivery, temperature monitoring and maintenance, early initiation and exclusive breastfeeding, and management of birth asphyxia (by sucking secretions using oral mucus sucker with mucus trap and ventilation by mouth to mask or tube and mask). There was a 62 percent reduction in neonatal mortality in the intervention villages as compared to the control villages. The case fatality rate for sepsis declined from 16.6 percent to just 2.8 percent. Studies from India, Bangladesh, Pakistan, and Nepal will provide further evidence in the coming years.

### **L. Treatment of Maternal Infections after Childbirth:**

Research in developing countries revealed that 5 percent to 20 percent of recently delivered women suffer from postpartum infection. Twelve<sup>47</sup> percent of all maternal deaths in Asia are due to sepsis. A study involving 6965 women in Malawi found that cleansing of the birth canal with 0.25 percent chlorhexidine solution during vaginal examinations was protective against postpartum infections<sup>48</sup>. Maternal infections after childbirth include metritis, pelvic abscess, peritonitis, mastitis, breast abscess, wound abscess, and urinary tract infections among others. However, metritis (infection of uterus) is the major cause of puerperal infection. The Cochrane review suggested that a combination of gentamicin and clindamycin is appropriate for the treatment of metritis. Regimens with activity against penicillin-resistant anaerobic bacteria are better than those without. Once uncomplicated endometritis has clinically improved with intravenous therapy, oral therapy is not needed<sup>49</sup>.

## **II) Other Essential Interventions**

### **M. Special Care for Low Birth Weight Babies:**

Low birth weight babies (< 2500 g) are prone to feeding difficulty, abnormal body temperature, breathing difficulty, necrotizing enterocolitis, anemia, jaundice, intraventricular bleeding, and low blood glucose among others<sup>50</sup>. Some of the problems can be managed in community or primary care settings while others require tertiary level neonatal care. There is a growing body of evidence that Kangaroo Mother Care (KMC) at community or facility levels reduces the risk of nosocomial infections, severe illness, lower-respiratory tract diseases and improves weight gain and exclusive breast-feeding. The Cochrane review on KMC found that neonates who were given KMC versus standard care had 51 percent lower risk of nosocomial infection, 70 percent lower risk of severe illness, and 63 percent lower risk of lower respiratory tract diseases at 6-month follow-up. In addition, the proportion of infants who were not exclusively breastfeeding at discharge was reduced by 59 percent, as was the rate of maternal dissatisfaction with method of care. Infants given KMC had also gained more weight per day by discharge (weighted mean difference: 3.6 gm per day)<sup>51</sup>. Community-based KMC was also found acceptable in studies in Bangladesh and India. A hospital based study in South Africa found that in 11 hospitals that had reliable perinatal problem identification program (PIIP) data for periods before and after the initiation of KMC, the neonatal death rate was 87.72/1,000 live births before KMC and 60.76/1,000 live births after KMC had been introduced. The large and significant reduction among

<sup>46</sup> Bang AT. Effect of home-based neonatal care and management of sepsis on neonatal mortality: field trial in rural India. *The Lancet*. 1999; 354:1955-1961

<sup>47</sup> Khalid S Khan et al. WHO analysis of causes of maternal death: a systematic review. *Lancet* 2006; 367: 1066-74

<sup>48</sup> Taha TE et al. Effect of cleansing the birth canal with antiseptic solution on maternal and newborn morbidity and mortality in Malawi: clinical trial. *British Medical Journal* 1997;315:216-20.

<sup>49</sup> French LM et al. Antibiotic regimens for endometritis after delivery. *Cochrane Database Syst Rev*. 2004 Oct 18;(4):CD001067

<sup>50</sup> World Health Organization. *Managing newborn problems: a guide for doctors, nurses, and midwives*. 2003

<sup>51</sup> Conde-Agudelo A, Diaz-Rossello J, Belizan J. Kangaroo mother care to reduce morbidity and mortality in low birthweight infants (Cochrane Review). Oxford, United Kingdom: Update Software; 2002



neonates weighing between 1000 gm and 1999 gm was associated with the introduction of KMC<sup>52</sup>. Unpublished data from a community-based study in Bangladesh found that KMC can significantly reduce mortality of neonates having birth weight of 2000 gm or less<sup>53</sup>.

#### N. Prophylactic Eye Care:

Ophthalmia neonatorum is caused primarily by *Neisseria gonorrhoea* or *Chlamydia trachomatis*. In developing countries such as Kenya, where rates of maternal STDs are high, rates of gonococcal ophthalmia range from 15 percent to 34 percent. A variety of interventions have been evaluated for prevention of ophthalmia neonatorum in developed countries, mostly in hospital settings. Studies have suggested that silver-nitrate, tetracycline, or erythromycin ointments given prophylactically are equivalent in efficacy. The WHO recommends 1 percent Silver-nitrate solution, 1 percent Tetracycline ointment, or 2.5 percent povidone-iodine within 1 hour of delivery. The American Academy of Pediatrics also considers 0.5 percent erythromycin ointment as standard therapy, in addition to silver-nitrate or tetracycline. Thus, the choice of the agent may be less important than wide-scale implementation of this intervention, which must be integrated into neonatal management packages, particularly in areas endemic for sexually transmitted diseases (STDs) due to gonorrhoea. In areas with low rates of gonococcal infections in pregnancy, the benefits of routine prophylaxis relative to other newborn interventions may be questionable<sup>54</sup>.

#### O. Iron and Folate Supplementation:

Iron deficiency anemia is associated with 22 percent of maternal deaths and 24 percent of the perinatal deaths. A recent meta analysis shows that correcting anemia of any severity reduces the risk of death. For each 1 gm/100 ml increase in hemoglobin (Hb) concentration the risk of maternal mortality decreases by 20 percent. This decrease of risk is continuous over the range of Hb concentration between 5 gm/100 ml to 12 gm/100 ml<sup>55</sup>. Dietary supplementation with folic acid, before conception and up to 12 weeks of gestation, reduces the risk of neural tube defects e.g., anencephaly, spina bifida<sup>56</sup>.

#### P. Maternal Nutrition:

Poor maternal nutritional status is associated with adverse birth outcomes though the association with fetal mortality is less clear. A review of nutritional interventions during pregnancy for the prevention or treatment of impaired fetal growth found that balanced protein energy supplementation reduced the risk of small for gestational age (SGA) by 30 percent while one trial conducted in USA reported a negative effect of high protein supplementation on SGA (58 percent increase in risk to SGA). Calcium supplementation was found protective against low birth weight. Micronutrient supplements did not affect birth weight, except for magnesium supplementation, which reduced the risk of SGA by 30 percent. Programmatic recommendations include intervening with balanced protein energy supplements, especially in population with a high prevalence of under nutrition<sup>57</sup>.

Another review by the same group of authors assessed the effectiveness of nutritional interventions to prevent or treat maternal morbidity, mortality and preterm delivery. The review recommended that iron and folate supplements reduce anemia and should be included in antenatal care programs. Calcium supplementation for women at high-risk of hypertension during pregnancy or low calcium intake reduced the incidence of both pre-eclampsia and hypertension. Fish oil and vitamins E and C are promising for preventing pre-eclampsia and preterm delivery but need further testing. Vitamin A and  $\beta$  Carotene reduced maternal mortality in a large trial; ongoing trials should provide further evaluation. No specific nutrient supplementation was identified for reducing preterm delivery. Considering the multifactorial etiology of the other conditions evaluated, it is unlikely that any specific nutrient on its

<sup>52</sup> Pattinson, R. C., A. M. Bergh, et al. (2006). "Does kangaroo mother care save lives?" J Trop Pediatr 52(6): 438-41

<sup>53</sup> Sloan NL. Community Based Kangaroo Mother Care (CKMC), presented during 2<sup>nd</sup> annual meeting of MotherNewBorNet

<sup>54</sup> Zulfikar A.B. et al. Community-based interventions for improving perinatal and neonatal health outcomes in developing countries: a review of evidence. Pediatrics 2005; 115; 519-617

<sup>55</sup> WHO analysis of causes of maternal deaths: a systematic review. The Lancet.;2006. 367: 1066-1074

<sup>56</sup> WHO Regional Office for Europe's Health Evidence Network (HEN). What is the effectiveness of antenatal care? (Supplement) December 2005

<sup>57</sup> Meriardi M et al. Nutritional Interventions during Pregnancy for the Prevention or Treatment of Impaired Fetal Growth: An Overview of Randomized Controlled Trials. J. Nutr. 133:1626S-1631S, May 2003

own, blanket interventions or magic bullets will prevent or treat pre-eclampsia, hemorrhage, obstructed labor, infections, preterm delivery or death during pregnancy<sup>58</sup>.

### Q. Family Planning:

Family Planning is regarded as one of the most cost-effective ways of reducing maternal, neonatal and child mortality. Findings from the studies in both rich and poor countries show that conceptions taking place within 18 months of a previous live birth are at greater risk of fetal death, low birth weight, prematurity, and being small size for gestational age<sup>59</sup>. The current WHO recommendations<sup>60</sup> of pregnancy spacing after a live birth and abortion are:

- After a live birth, the recommended interval before attempting the next pregnancy is at least 24 months in order to reduce the risk of adverse maternal, perinatal and infant outcomes. It is pertinent to mention that in the case of birth-to-pregnancy intervals of five years or more, there is evidence of an increased risk of pre-eclampsia, and of some adverse perinatal outcomes, namely pre-term birth, low birth weight and small infant size for gestational age.
- After a miscarriage or induced abortion, the recommended minimum interval to next pregnancy should be at least six months in order to reduce risks of adverse maternal and perinatal outcomes.

### R. Immunization of Newborns:

**Bacille Calmette Guerin (BCG) vaccine:** BCG is the most widely used vaccine in the world. A meta analysis published in 1994 attempted to quantify the efficacy of BCG vaccine against tuberculosis (TB). The analysis revealed that in the trials, the relative risk of TB was 0.49 for vaccine recipients compared with non-recipients (protective effect of 51 percent). In the case-control studies, the protective effect was found to be 50 percent. Seven trials reporting tuberculosis deaths also showed a protective effect from BCG vaccine of 71 percent, and five studies reporting on meningitis showed a protective effect from BCG vaccine of 64 percent. Geographic latitude of the study site and study validity score explained 66 percent of the heterogeneity among trials in a random-effects regression model.<sup>61</sup>

However, there is ongoing debate about the range of effectiveness of BCG vaccines and also about the duration of protection after receiving the BCG vaccination. Despite the debate, BCG is used in areas of the world where TB is highly prevalent, and the chances of an infant or young child becoming exposed to an infectious case are high.

**Oral Polio Vaccine (OPV):** Since development in 1958, OPV was found to be highly effective in epidemiological evaluations in different parts of the world. A study in India found that vaccine efficacy for Trivalent Oral Polio Vaccine (TOPV3) was 81 percent for the 6-35 month age group and 86 percent for the 6-23 month age group. Vaccine efficacy, after controlling for age using the Mantel-Haenszel method, was 83 percent. The study also revealed that an unimmunized child was at 5 times greater risk of developing acute paralytic poliomyelitis than children receiving all 3 doses of TOPV3, at 4.2 times greater risk than those receiving 1 dose, and at 2.8 times greater risk than those receiving 2 doses<sup>62</sup>. Another case-control study in Egypt found that vaccine efficacy was 86 percent and 92 percent for 3 and 4 doses of OPV respectively<sup>63</sup>. Some countries prefer inactivated polio vaccine (IPV) to OPV due to comparative advantages in preventing vaccine-associated polio paralysis (VAPP), and easy storage.

**Hepatitis B Vaccine (HBV):** Hepatitis B vaccine is administered universally at birth in developed countries. Developing countries recently incorporated HBV in the national immunization program.

<sup>58</sup> Villar J, Meriardi M, Gulmezoglu A, et al. Nutritional interventions during pregnancy for the prevention or treatment of maternal morbidity and preterm delivery: an overview of randomized controlled trials. *J Nutr.* 2003;133(5 suppl 2):1606S–1625S

<sup>59</sup> Cleland J et al. Family planning: the unfinished agenda. *The Lancet. Sexual and Reproductive Health Series.* 2005 Nov; DOI:10.1016/S0140-6736(06)69480-4

<sup>60</sup> The World Health Organization. Report of a WHO technical consultation on birth spacing. 2005

<sup>61</sup> Colditz GA et al. Efficacy of BCG vaccine in the prevention of tuberculosis. Meta-analysis of the published literature. *JAMA.* 1994 Mar 2;271(9):698-702.

<sup>62</sup> Deivanayagam N et al. Clinical efficacy of trivalent oral poliomyelitis vaccine: a case-control study. *Bull World Health Organ.* 1993;71(3-4):307-9.

<sup>63</sup> Kotb MM et al. Epidemiological evaluation of oral polio vaccine efficacy in Cairo. *J Egypt Public Health Assoc.* 1993;68(5-6):617-25.

Studies in Gambia<sup>64</sup> found that in 94 percent of children, HBV immunization with 3 doses produced protective levels of antibodies at 1 year of age. As a result of the vaccination program, protection against infection was more than 80 percent and the protection against carriage status was more than 90 percent. Due to national immunization program in Taiwan, the overall prevalence rate of HBsAg decreased from 9.8 percent in 1984 to 1.3 percent in 1994 in children >10 years of age. The overall prevalence rate of HBeAg was 26 percent in 1984, 15 percent in 1989 and 4 percent in 1994. The average annual incidence of hepatocellular carcinoma in Taiwanese children aged 6–14 years declined from 0.7 per 100,000 children in 1981–1986 to 0.36 per 100,000 children in 1990–1994. The average mortality associated with fulminant hepatitis in infants from 1975–1984 was 5.36/100,000 infants, which decreased to 1.71/100,000 infants for the period 1985–1998<sup>65</sup>.

### III) Context Specific Interventions

#### **S. Intermittent Presumptive Treatment for Malaria:**

Intermittent presumptive treatment (IPT) in pregnancy involves giving a curative treatment dose of an effective antimalarial drug at predefined intervals during pregnancy. IPT in pregnancy was first introduced in areas of high malaria transmission as a measure to reduce the adverse outcomes of *Plasmodium falciparum* malaria infection during pregnancy. *Plasmodium falciparum* malaria in pregnancy poses substantial risk to a pregnant woman and her neonate in terms of anemia and low birth weight (LBW), respectively, and is responsible for up to 35 percent of preventable LBW in malaria-endemic areas. Current guidelines from the WHO recommends that women in highly malarious areas receive at least two doses of IPT with an effective antimalarial in the second and third trimesters of pregnancy as part of routine antenatal care.

A study<sup>66</sup> among Malawian women delivering in a large urban hospital demonstrated that IPT with sulfadoxine-pyrimethamine (SP) was associated with a decrease in placental malaria prevalence (from 31.9 percent with no SP prescription to 22.8 percent with 2 or more doses of SP) and density. There was also a decrease in the prevalence of low birth weight (from 23 percent in women not receiving SP to 10.3 percent in women given 2 or more doses), and higher maternal hemoglobin concentrations. Another study<sup>67</sup> also found that two doses of IPT with sulfadoxine-pyrimethamine (SP) during the second and third trimester of pregnancy were effective at decreasing the prevalence of placental malaria in human immunodeficiency virus (HIV)-negative women, while HIV-positive women may require a monthly SP regimen to reduce their prevalence of placental parasitemia. Another study in Kenya also found that more than one dose of IPT with SP was associated with 35 percent reduction in LBW. One dose of IPT was associated with a mean increase in birth weight of 54 gm. Two or more doses of IPT were associated with a mean increase in birth weight of 128 gm. Studies also indicated that IPT can be given as directly observed therapy in antenatal clinic programs to achieve high program effectiveness.

Currently, IPT with sulphadoxine-pyrimethamine (SP) is recommended to prevent the adverse outcomes associated with malaria during pregnancy. It is low cost, widely availability, has easy deliverability and acceptability, which make it the clear choice where resistance to SP is low. However, because of rapidly increasing resistance, it is unlikely that IPT with SP in pregnancy is equally effective in all regions where malaria is endemic. For countries where resistance to SP is rising or already high, amodiaquine (alone or in combination with SP or artesunate); artesunate + SP; chlorproguanil-dapsone (with and without artesunate) and artemether-lumefantrine require urgent evaluation for use in pregnancy<sup>68</sup>. In addition, more research is needed on malaria during pregnancy in areas with *Plasmodium vivax*<sup>69</sup>.

<sup>64</sup> The Gambia Hepatitis Study Group. Hepatitis B vaccine in the expanded programme of immunisation: the Gambian experience. *Lancet*. 1989;1(8646):1057–1060

<sup>65</sup> Chen D, Hsu N, Sung J, et al. A mass vaccination program in Taiwan against hepatitis B virus infection in infants of hepatitis B surface antigen-carrier mothers. *JAMA*. 1987;257:2597–2603

<sup>66</sup> Rogerson, S.J., et al., Intermittent sulfadoxine-pyrimethamine in pregnancy: effectiveness against malaria morbidity in Blantyre, Malawi, in 1997-99. *Trans R Soc Trop Med Hyg*, 2000. 94(5): p. 549-53.

<sup>67</sup> Wolfe, E.B., et al., Cost-effectiveness of sulfadoxine-pyrimethamine for the prevention of malaria-associated low birth weight. *Am J Trop Med Hyg*, 2001. 64(3-4): p. 178-86

<sup>68</sup> Newman RD et al. Safety, efficacy and determinants of effectiveness of antimalarial drugs during pregnancy: implications for prevention programmes in *Plasmodium falciparum*-endemic sub-Saharan Africa. *Trop Med Int Health*. 2003 Jun;8(6):488-506

<sup>69</sup> Desai M, ter Kuile FO, Nosten F, McGready R, Asamoah K, Brabin B, Newman RD. 2007. Epidemiology and burden of malaria in pregnancy. *Lancet Infect Dis* 7(2):93-104.

### T. Iodine Supplementation:

Clinical effects of iodine deficiency are particularly serious during pregnancy, and can result in miscarriages, early infant death, LBW, and cognitive deficiencies. Three trials involving 1551 women were included in the Cochrane review<sup>70</sup> on the impact of maternal iodine supplementation on pregnancy outcomes, including cretinism and mortality of offspring. These trials were conducted in Papua New Guinea, Zaire and Belgium, all areas of endemic iodine deficiency. The studies revealed that the use of injectable iodized oil resulted in a 29 percent reduction in infant and child mortality, 73 percent reduced risk of endemic cretinism by the age of 4 years, and better psychomotor development scores between four to 25 months of age. The trial from Zaire further revealed that administration of iodized-oil injections was effective in reducing infant mortality and improving neurological outcomes even when given in mid-pregnancy. Another trial in rural China also found that administration of iodine in drinking water resulted in 65 percent reduction in neonatal mortality.<sup>71</sup> However, no data are available in regards to supplementation of iodine in salt. No adverse effects were reported in any of these trials.

The evidence indicates the enormous potential of iodine supplementation, especially in countries with endemic iodine deficiency. Therefore, administration of adequate amounts of iodine during pregnancy to expectant mothers should be an important component of health care interventions during pregnancy.

### U. Syphilis Detection and Treatment:

In Malawi, a longitudinal population-based study revealed a population attributable risk for syphilis of 26 percent among all fetal deaths and 38 percent for antepartum fetal deaths. The reported seroprevalence of syphilis among women attending antenatal clinics in African, Asian, and Latin American countries ranges from 4 percent to 19 percent.<sup>72</sup>

The potential benefits of large-scale population based intervention strategy for the prevention, detection, and treatment of congenital syphilis is strengthened by the experience in developed countries. The prevalence of congenital syphilis was reduced by as much as 70 percent by a large screening and intervention program in Milwaukee. A study in a periurban setting of Zambia revealed that on-site RPR serological testing for syphilis and on-site treatment can reduce adverse pregnancy outcomes (abortion, stillbirth, preterm birth, LBW and congenital syphilis). As a combined entity these outcomes were significantly reduced in the study area (28 percent) compared to the control area (72 percent).<sup>73</sup> An observational study in Kenya<sup>74</sup> also demonstrated that women who were diagnosed and treated for syphilis during pregnancy had 75 percent lower risk of giving birth to an LBW infant. This study also revealed that screening for and treatment of syphilis is a cost-effective means of reducing fetal deaths.

Information from other studies also suggests universal screening, preferably on-site, as the appropriate option because it ensures immediate treatment. The World Health Organization recommends that when a country has a lack of resources along with a high prevalence of syphilis, it is advisable to treat at least all non-treponemal tests seropositive pregnant women.

### V. Prevention of Mother to Child Transmission of HIV:

Pregnant women living with HIV infection are at risk of transmitting HIV to their infants either during pregnancy, during birth or through breastfeeding. Over 90 percent of new infections in infants and young children occur through mother to child transmission. Without any interventions, between 20-45 percent of infants may become infected through this mode of transmission. The ACTG 076 study in France and the United States demonstrated that Zidovudine could reduce the probability of perinatal transmission of HIV by almost 70 percent, but used relatively expensive and complex protocols typical

<sup>70</sup> Mahomed K, Gulmezoglu A. Maternal iodine supplements in areas of deficiency. In: Cochrane Database Syst Rev. 2000:CD000135

<sup>71</sup> Delong G, Leslie P, Wang S, et al. Effect on infant mortality of iodination of irrigation water in the severely iodine deficient areas of China. *Lancet*. 1997;350:771-773

<sup>72</sup> Zulfiqar A.B. et al. Community-based interventions for improving perinatal and neonatal health outcomes in developing countries: a review of evidence. *Pediatrics* 2005; 115: 519-617

<sup>73</sup> Hira S, Bhat G, Chikamata D, et al. Syphilis intervention in pregnancy: Zambian demonstration project. *Genitourin Med*. 1990;66:159-164

<sup>74</sup> Temmerman M, Gichangi P, Fonck K, et al. Effect of a syphilis control programme on pregnancy outcome in Nairobi, Kenya. *Sex Transm Infect*. 2000;76:117-121

of high-income countries (oral doses 5 times daily during pregnancy, intravenous administration to the mother intrapartum, and oral doses 4 times daily to the newborn for 6 weeks after birth). For resource-limited settings, there has been interest in the potential impact of short-course regimens. In a study in Thailand, twice-daily doses of zidovudine from 36 weeks of gestation and every 3 hours during labor reduced transmission risks by 50 percent if the mother did not breastfeed her infant. The HIVNET 012 trial in Uganda found a 53 percent reduction in relative transmission risk at 14 -16 weeks) for a single-dose of nevirapine during labor followed by a single dose given to the infant within 72 hours of birth, when compared with multiple doses of zidovudine administered during labor followed by twice-daily doses given to the infant for 7 days after birth. The Petra study in South Africa, Uganda and the United Republic of Tanzania, compared zidovudine plus lamivudine in three different protocols (prepartum, intrapartum and postpartum; intrapartum and postpartum; and intrapartum alone) and found relative risks of HIV infection or death (at week 6 postpartum) of 0.39, 0.64 and 0.97 for the three protocols, respectively, compared to placebo treatment. The convergence of infection levels in the treatment and control arms of the study by the time the infants were 18 months old suggests risks associated with breastfeeding. Taken together, these studies indicate that short courses of antiretroviral therapy can reduce perinatal transmission by approximately 50 percent<sup>75</sup>. During the 2007 conference on retroviruses and opportunistic infections, WHO stated that the risk of mother to child transmission of HIV can be reduced to less than 2 percent by a package of evidence-based interventions comprising antiretroviral prophylaxis and treatments combined with elective caesarian section and avoidance of breastfeeding. In most industrialized countries where this package is now the standard of care, its large-scale implementation has led to the virtual elimination of new pediatric HIV infections<sup>76</sup>. Preventing transmission of HIV from an infected woman to her baby is one of the four prongs of PMTCT (Prevention of Mother to Child Transmission). The other prongs are prevention of HIV infection in women, prevention of unintended pregnancy among HIV infected women, and care, treatment and support for HIV infected women, partners, babies and children.

## Section II: Progress Towards Implementing MAMAN: Experiences from the Field

### Application of ReduceAlive Advocacy Model and Implementation of the Road Map in Africa by Doyin Oluwole

To support countries in the African region to move towards the attainment of the MDGs, the African Regional Reproductive Health Task Force in October 2003, called on all partners to develop and implement a road map for accelerated maternal and newborn mortality reduction. In February 2004, a multi-agency<sup>77</sup> meeting was held to develop the Road Map for Accelerating the Attainment of the MDGs Related to Maternal and Newborn Health (MNH). The guiding principles of road map include: evidence base; phased planning and implementation at country level; health systems approach; equity and accessibility; partnership with clear definition of roles and responsibilities; transparency and accountability. Fifteen development partners<sup>78</sup> and the African Union have committed to supporting country-level implementation of the Road Map.

The Road Map provides strategic direction for improved MNH and survival in countries by achieving consensus among all partners on the way forward for the next decade through long term planning and commitment. It also promotes the inseparable dyad of mother and newborn, focuses on two major interventions (skilled care for mothers and newborns and demand creation at community level) to make a difference, gives special attention on emergency obstetric and newborn care, offers opportunity for harnessing resources from all partners, takes account of interventions that are evidence-based, cost-effective and feasible even in poor resource settings.

<sup>75</sup> Hogan, D.R. and J.A. Salomon, Prevention and treatment of human immunodeficiency virus/acquired immunodeficiency syndrome in resource-limited settings. *Bull World Health Organ*, 2005. 83(2): p. 135-43.

<sup>76</sup> <http://www.who.int/hiv/mediacentre/PMTCTbriefingnote.pdf>

<sup>77</sup> UNFPA, UNICEF, USAID, Advance Africa, Engender Health, WAHO, MNH/JHPIEGO, CRHCS, FCI, FHI, RHRU Johannesburg, SARA/AED, Representatives of the Global Partnership of Safe Motherhood and Newborn Health, representatives of the African Regional RH Task Force, Ministry of Health Officials from Tanzania and Zimbabwe, as well as representatives from WHO country offices, regional offices and headquarters in Geneva

<sup>78</sup> WHO, UNFPA, UNICEF (ESARO & WCARO), World Bank, USAID, WAHO, CRHCS, RHRU/University of Witwatersrand, AED, FCI, JHPIEGO, Population Council, SNL, EngenderHealth

### Objectives and strategies in the Road Map:

**Objective 1: *Provide skilled attendance during pregnancy, childbirth and postnatal period at all levels of the health care delivery system by:***

- Improving provision of, and access to, quality MNH care including FP services
- Strengthening the referral system
- Strengthening district health planning and management of MNH care & FP services
- Advocating for increased commitment and resources for MNH and FP
- Fostering Partnerships

**Objective 2: *Strengthen the capacity of individuals, families, and communities to improve MNH by:***

- Promoting the household to hospital continuum of care
- Empowering communities

Since its development in 2004, 36 of the 46 sub-Saharan African countries have started the process of the development of their national Road Maps; 24 of those already have their country-specific Road Maps; 7 others are currently developing theirs; and seven of the 24 countries have developed an advocacy strategy using the ReduceAlive model.

The ReduceAlive model is a way to stimulate policy dialogue and strategic planning on MNH by mobilizing decision makers to take appropriate action to reduce maternal mortality and morbidity and to increase newborn survival. The advocacy process using ReduceAlive brings together local champions of maternal and newborn health issues and energizes them around a coherent set of goals. The ReduceAlive model uses interactive computer simulations to estimate the consequences of poor maternal and neonatal health and care, such as maternal, newborn, and child deaths; short- and long-term illnesses and disabilities; and economic productivity losses. The information generated through computer projections provides sound arguments for giving higher priority to maternal and newborn health in policy formulation, strategy development, and resource allocation.

The Reduce component of the model examines health and obstetric factors contributing to maternal mortality, disabilities, and economic productivity losses, such as hemorrhage, pregnancy-related high blood pressure, infections, obstructed labor, tetanus, malaria, anemia, and unsafe abortions. On the other hand, the Alive component examines factors that affect the newborn, including neonatal tetanus, neonatal sepsis, congenital syphilis, birth asphyxia, maternal iodine deficiency, preterm birth, and low birth weight.

Appropriate use of the ReduceAlive model allows country stakeholders to make projections about the survival, health, and economic impact of maintaining the status quo versus implementing high-impact interventions that result in reductions in mortality and morbidity. Though ReduceAlive provides a framework for discussion on the most appropriate interventions in a given setting, it does not compare the cost-effectiveness of different interventions or prioritize them.

The application procedure of the ReduceAlive model involves a two-week participatory process that develops local capacity to use computer models for advocacy through sequential use of the following six steps:

- Formation of a multidisciplinary team
- Collection and review of local and international information
- Use of a prepackaged computer model
- Building consensus among team members
- Training of the team to use computer models and advocacy planning
- Advocacy with government officials and representatives from donor agencies, civil society, and the media

## Summary of Experiences in Applying the Road Map and ReduceAlive Advocacy Model in African Countries:

The ReduceAlive model has been used successfully administered to attain the following positive results in the context of the Road Map in sub-Saharan African countries including Burkina Faso, Ethiopia, Ghana, Mali, Mauritania, Mozambique, Niger, Nigeria, Senegal, Togo, Uganda.

- **Policy uptake and prioritization of MNH:** The Road Map has resulted in an unprecedented speed of policy uptake across African countries within 2 years demonstrated by the fact that heads of state have officiated at national launches and made immediate decisions to include the reduction of maternal mortality e.g., in Ethiopia.
- **Partnership:** It has united governments and their partners around a common set of goals for improved maternal and newborn health e.g., in Mali and Senegal.
- **Increased resources for maternal and newborn health:** Pooling of government and partner resources for improved maternal and newborn health is a major outcome of the application of ReduceAlive advocacy model and the Road Map as was demonstrated in Burkina Faso, Mozambique, Malawi and Nigeria.
- **Improved financial access to health by the poor:** Based on the advocacy and awareness raising generated by the Road Map and ReduceAlive, governments have provided subsidized or free care (e.g., free caesarean sections) for women during pregnancy and childbirth in Mali and Burkina Faso.

## Expansion of Program Activities for Improving Newborn Health in Senegal: Experiences and Lessons Learned by Indira Narayanan

Interventions promoting an essential newborn care package were carried out in Senegal, initially in Kebemer District between 2003-2004. The interventions were delivered by a total of 342 health workers (13 core trainers, 45 skilled facility level workers, 19 less skilled '*matrones*'<sup>79</sup> and 265 community level workers). Improvement in the competence of skilled staff and of the '*matrones*' occurred with supportive supervision following training workshops using pre-defined checklists. The areas in which improvement occurred were care at birth, resuscitation of newborn, application of principles of infection prevention, appropriate maintenance of basic equipment and supplies, and early postpartum care. Maternal knowledge and behavior related to birth planning, breastfeeding, temperature maintenance, and danger signs and early postpartum visit also improved.

Implementation of the interventions was expanded between 2005 – 2006 into 8 districts in the regions of Mbour and Zigenchor covering 853 health workers (290 skilled attendants and 207 '*matrones*' in health centers and health posts and 356 community health workers). During the expansion phase additional supportive supervision and other inputs were not possible and the training period was decreased due to lack of resources. Illustrative examples of changes due to interventions during pilot and expansion phase are noted below:

At Kebemer, care by skilled attendants at birth and in the postpartum clinic increased from 61 percent to 91 percent and from 59 percent to 81 percent, respectively, at the end of the pilot implementation. During the expansion phase with no additional supportive supervision, skilled attendants at birth and in the postpartum clinic fell to 81 percent and 74 percent respectively. Similarly, among '*matrones*' involved in care at birth, competence rose from 73 percent to 85 percent during the pilot phase and fell to 81 percent during expansion phase. Due to change in strategies for supervision by Ministry of Health only one post training evaluation was possible in the expansion areas. Competence among skilled staff for care at birth and in the postnatal clinic was 94 percent and 78 percent respectively and among the '*matrones*' for care at birth was 83 percent. Despite the shorter training period, the initial competence in the expansion areas was better than in the pilot area, probably because of increased emphasis on competency based training and use of job aids. Improvements were also observed in terms of logistics, supplies and equipment; actions for infection prevention and management of records.

Lessons learned for this initiative include the continued need for advocacy and linking with partners; emphasis on competency and use of job aids during training; supportive supervision; and the importance of community support through communication and mobilization strategies. Refreshers are

<sup>79</sup> Matrones are traditional birth attendants in Senegal

likely to be beneficial, especially as more and more time elapses following the initial training, particularly among less skilled workers. Political buy-in and support by stakeholders are also necessary to have adequate resources and support to implement and sustain effective programs, especially during the expansion phase.

## **Introducing the MAMAN Package into PVO Projects in Kenya and Bangladesh by Michel Pacqué and Janet Meyers**

Janet Meyers and Michel Pacqué from Child Survival Technical Support Plus (CSTS+) visited AMREF (African Medical and Research Foundation) in Kenya and CWI (Concern Worldwide Incorporated) in Bangladesh to identify solutions to problems and challenges to the implementation of the MAMAN package and to assess the possibility of measuring annual progress. The visit included working with PVO staff, local partners as well as other interested stakeholders. AMREF, Kenya was in the first year of the Child Survival and Health Grants Program (CSHGP) and CWI, Bangladesh was in its second year of implementation. During the visit practical problems and solutions to problems were identified and discussed. A description of findings during the visit is given below:

### **AMREF, Kenya:**

CSHGP supported project of AMREF reconstructed the MAMAN package to make it applicable to the Kenyan setting and found that a separate work plan was not needed for implementing it. The project assigned specific roles for the district medical office, AMREF staff, communities and families to implement the package. After the initial implementation, a lot quality assurance sampling (LQAS) survey was conducted. Data from this survey were compared with baseline survey data of a subset of mothers having 0-11 month old children. After one year of implementation, improvement of TT coverage and maternal postpartum visits were observed. Proportions of babies received clean cord care, drying and wrapping, colostrums feeding, postnatal visit were 75, 44, 91 and 20 percent respectively. Fourteen percent mothers received AMTSL during their childbirths. However, these indicators were not included during baseline survey. No improvement was noticed in skilled attendance at delivery and immediate initiation of breastfeeding. Due to paucity of information, AMREF proposed to implement an operation research protocol to generate evidence of feasibility and effectiveness of MAMAN.

### **CWI, Bangladesh:**

CWI, White Ribbon Alliance, and Child Survival Technical Support Plus (CSTS+) conducted a technical consultative meeting around the MAMAN package where the following key points emerged:

#### *About components of MAMAN package:*

- The two postpartum visits suggested by MAMAN (the first within 24h and the second between 3<sup>rd</sup> to 6<sup>th</sup> postpartum day) should be conducted keeping in mind that cultural taboos may prevent some women leaving the home during the first 7 days after delivery of the baby. Answers to who would conduct these visits, where they would be conducted and what messages would be imparted, may be available from upcoming research from ICDDR,B.

#### *About operational issues:*

- Community participation during MAMAN implementation is important and community should be reassured to establish continuum of care
- Referral to facilities is critical and high quality of care at referral facilities should be ensured
- Instead of high-risk pregnancy identification, all women should be presumed to be at risk of developing complications, and communities should be educated on detection of danger sign and referral during emergency
- In areas where access to high quality referral services is difficult, delivery by trained TBAs or community-based skilled birth attendants (CSBA) is an achievable intermediary approach



About Monitoring:

- A selection of monitoring indicators at community level may complement the MAMAN indicators
- Verbal autopsies, maternal death audits and 'near-miss' investigations are useful as programmatic tools but less useful as tools for evaluating impact
- Deliveries conducted by TBAs should be reported separately from those by skilled birth attendants

In Rangpur district, CWI and its partners introduced and reviewed the MAMAN package. It was seen that ongoing maternal and neonatal health activities were well in line with the MAMAN interventions at the community level. Facility activities were less under CWI control but priorities and gaps were identified. This information will help to establish 'centers of excellence'.

Data from the district comparing selected MAMAN indicators at baseline and in September 2006 showed improvement in TT immunization, skilled attendance, immediate initiation of breastfeeding, colostrums feeding, postpartum and postnatal visits but no improvement was identifiable in frequency for two or more doses of TT. Data was unavailable for AMTSL, clean cord care, drying and wrapping and pre-lacteal feeds.

In summary, it can be said that both PVOs showed interest in MAMAN implementation and advised introduction at the design phase of projects. MAMAN indicators are hoped to become routine indicators for these PVOs so that progress can systematically be documented over time.

## **Community-Based Maternal-Neonatal Care (CB-MNC) in Nepal by Steve Hodgins**

Under the rubric of Community-Based Maternal-Neonatal Care (CB-MNC), USAID's main MCH/FP bilateral in Nepal, the Nepal Family Health Program (NFHP), has been supporting the Nepal Ministry of Health and Population (MOHP) in implementing a minimum package of high-impact, cost-effective and largely community-based interventions. The package of interventions has the potential for population-level mortality impact over the short to medium term and is regarded as complementary to but not substitution for institutionalized skilled birth attendance.

Actual provision of services is entirely by staff and volunteers under the government system and operates at district-wide scale in each of the three program districts (Banke, Jhapa and Kanchanpur). Project support consists mainly of training, and monitoring and evaluation. NFHP support has mobilized involvement by a number of partners including JSI R&T (John Snow Inc. Research & Training Institute), EngenderHealth, SC/USA (Save the Children USA), JHPIEGO (Johns Hopkins Program for International Education in Gynaecology and Obstetrics) and JHUCCP (Johns Hopkins University Center for Communication Program). Technical support for monitoring and evaluation has been provided by JHU/HARP-GRA (Johns Hopkins University/Health Research Program-Global Research Activity). PLAN International has also provided limited material and technical support.

Service began in Banke and Jhapa districts in September 2005 and, in Kanchanpur, in August 2006. The approach varies by district but the overall shape of the intervention is as follows:

Antenatal counseling and other services:

Antenatal counseling and other services are provided by Female Community Health Volunteers (FCHVs), addressing pregnant women and other household decision-makers. The counseling is intended to be participatory and problem-focused. Topics include:

- Seeking of specific antenatal services (e.g. TT, iron, de-worming etc.)
- Seeking of skilled attendance (or EOC) at delivery (including financial and transport planning)
- Recognizing and promptly seeking care for danger signs (including locality-specific information on where to go for care)
- Performing essential new-born household care practices (clean delivery, appropriate cord-care, temperature control, breast-feeding - early & exclusive to 6 months)
- Seeking of infant immunization and postpartum family planning services and
- Informing FCHVs soon after delivery, to trigger a postpartum home visit

FCHVs also use this contact to dispense iron/ folate. In Banke, to reduce risk of postpartum hemorrhage among women delivering without skilled birth attendance, FCHVs are also dispensing misoprostol to women in their eighth month of pregnancy, with instructions on its use. In addition, there have been complementary BCC/community mobilization activities (radio drama serial, street-theater etc.) in each of the 3 districts.

#### Strengthening existing services:

Strengthening existing services includes minor renovations/repairs and provision of training and equipment for selected sites providing basic essential obstetrics care (BEOC) and other delivery services, service mapping/inventory for skilled attendance and management of complications (pregnancy-related, delivery-related, postpartum and neonatal); logistical and other monitoring.

#### Postpartum home visits:

Postpartum home visits are provided by FCHVs (with or without TBA), within 2-3 days after birth. The visits include:

- Assessment (case-detection): looking for danger signs and making referrals, as appropriate
- Counseling/negotiation especially on essential newborn care and breastfeeding, and also on immunization and family planning
- Dispensing of iron, vitamin A
- Documentation (supporting birth registration and on findings and process of care)

In addition to postpartum home visits, a low-birth-weight package is being implemented by ACCESS in Kanchanpur District.

Preliminary findings from the program show that the program has been well received by both health workers and the community people. However, in Banke, health workers have found the documentation tools and process somewhat burdensome. Baseline surveys in households with recently delivered women have been conducted in all 3 districts (60 x 15 cluster samples in each district). Follow-up surveys will be conducted in Banke and Jhapa in the second quarter of 2007 to document evidence of impact. Data from project management information system suggest increasing coverage of pregnant and newly delivered women (60 percent in Banke, 41 percent in Jhapa) and also show significant increases in appropriate household practices and care-seeking.

The Family Health Division (FHD), under MOHP, has been actively involved and is interested in scale-up of this initiative. The current program can be improved through inclusion of further intervention elements e.g., antenatal and neonatal vitamin A, antenatal deworming, chlorhexidine for early neonatal cord-care. Under FHD leadership, and together with SC/USA and other partners, CB-MNC and other community-level Safe-Motherhood/ Neonatal interventions in Nepal are expected to be reviewed to reach a technical consensus on the best ways to improve maternal and newborn health in Nepal.

## **PAIMAN Household Survey Findings, 2006 by Nabeela Ali**

A household baseline survey was conducted in all the ten PAIMAN (Pakistan Initiative for Mothers and Newborns) districts during the October - December 2006. The findings show that a small proportion of married women were able to name three or more danger signs during pregnancy, delivery and the postpartum period in all the PAIMAN districts. The findings also show that women ranging from 71 percent in Rawalpindi to only 8 percent in Jafarabad went for at least 3 ANC visits during their last pregnancy. Overall 27 percent of the pregnant women had three or more ANC visits in PAIMAN districts.

As a whole, 40 percent of pregnant women had 2 or more TT shots during their last pregnancy. This ranges from 68 percent among pregnant married women in Rawalpindi to 27 percent in Jafarabad. Findings also show that even though a majority of the women believe that services during childbirth should be obtained from a hospital, only about 35 percent of the women had their babies delivered through skilled birth attendants (SBA). Many households do not have any arrangement for transport, provision for blood or finances for women at the time of need during delivery. Overall 3.5 percent of the deliveries were conducted by caesarean section (0.5 percent in Buner to 10.5 percent in Jhelum).

Married women in PAIMAN districts generally undervalue the importance of postnatal care. More than 95 percent of the married women who delivered at home did not receive any postnatal check-ups after their last pregnancy. Unfortunately, many women are also unaware of danger signs that may appear in newborns, especially in the first seven days after delivery. A lack of physical and medical examinations after birth may potentially result in complications being left undetected and untreated.

The mothers who gave colostrum to their newborns vary from 24 percent in Rawalpindi to 6 percent in Lasbela. Furthermore, a very large percentage of respondents in all districts provided their newborns with food supplements other than breast-milk within the first three days following delivery.

The findings show that the PAIMAN districts are at different stages of maternal and newborn health status and care practices. Married women in some districts have better access to health services compared to other districts. There is a necessity for improvement of knowledge and awareness of these women regarding danger signs during pregnancy, delivery, postpartum and neonatal period. This will facilitate women to seek skilled care during their pregnancy and afterwards.

## **Summary of Survey and Interview Data from Lao Neonatal Resuscitation Training Program by Robert Clark**

In November 2005 a neonatal resuscitation training program was launched, sponsored by the new Lao Neonatology Network (LNN) in collaboration with Latter Day Saints (LDS) Charities, a faith-based NGO from USA. During the implementation of training program, two train-the-trainer courses were conducted by a USA training team covering 100 doctors and midwives representing most of the provinces in Lao PDR. The training curriculum was a simplified version of the Neonatal Resuscitation Program, produced by the American Academy of Pediatrics. In July 2006 Dr. Bounnack, a senior Lao pediatrician conducted an evaluation of the training and dissemination effort with technical support from Dr. Cecil Clark, and volunteer from LDS Charities.

Evaluation methods involved surveys using self-administered questionnaire (sent to 90 doctors, 60 of whom responded), group interviews with 2-6 doctors in each of the 6 hospitals and knowledge and skills test with the same doctors who attended group interviews. In the knowledge and skill test, each group went to a mannequin on the table and was asked questions about proper procedures for a newborn resuscitation. Then the group was again asked to demonstrate correct procedures using the mannequin. A general assessment of their level of knowledge and skill was thus made.

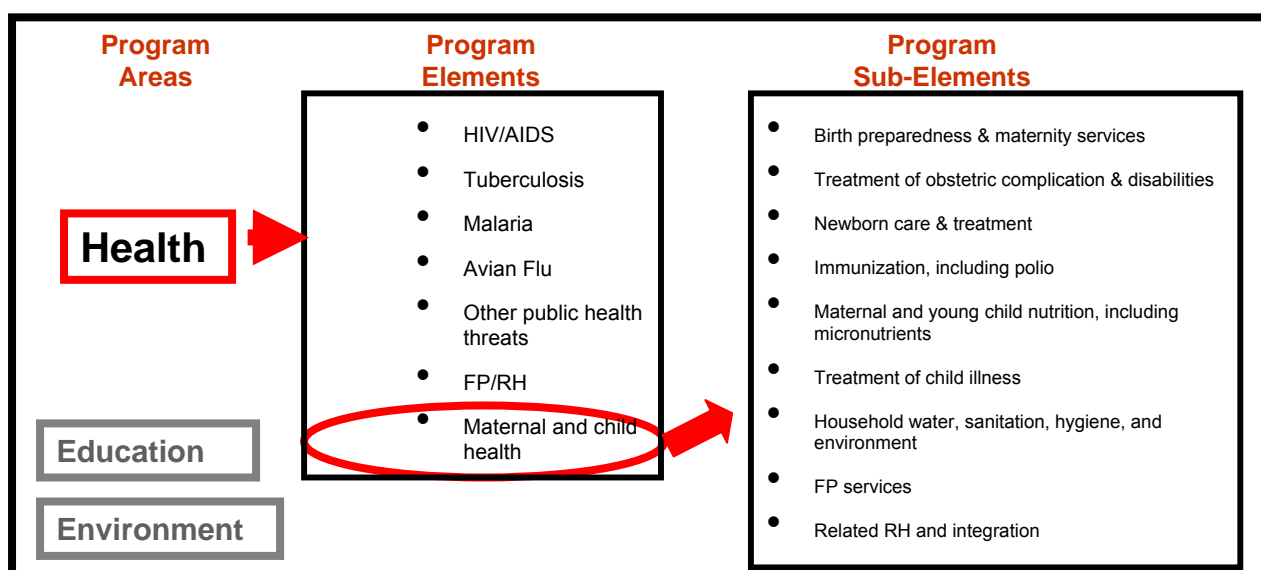
Doctors felt that they had remembered much of their training and expressed considerable confidence in their ability to use it in resuscitation procedures. At the same time, they also emphasized the need for refresher courses by expert trainers, more practice, and more opportunities to actually use the procedures. About 87 percent of the doctors reported having used their training, and about the same percentage reported that each of them has helped to save one to more than five newborns over eight months period.

Most of the delivery rooms now have at least a bag and mask. The groups felt a need for more equipment, at least a heat source and a suction device. This equipment would facilitate their use of the training they have received. Although there has not yet been any systematic training for all providers, there is evidence that those trained have tried to train their colleagues on an informal basis.

## **USAID's Maternal and Newborn Health Program Indicators by Lily Kak**

The new US Government Foreign Assistance Reform emphasizes increased accountability. A set of global standard indicators has been identified to monitor high priority technical interventions and programs across countries. Figure 2 below lists the elements within health and focuses on the maternal and child health interventions. A centralized data system has been developed to capture annual output-level performance data from all US Government-supported programs. Missions are encouraged to monitor program outcomes, including coverage of key interventions, through Demographic Health Surveys (DHS), interim surveys between DHS rounds, facility-based monitoring, and routine program monitoring.

**Figure 2: Strategic Objective: Investing in People**



The seven indicators that have been identified to track USAID programs in maternal and newborn health are given below:

- a) Postpartum/newborn visits within three days of birth (includes all skilled attendant deliveries plus facility, outreach, community-based, or traditional birth attendant visits for mothers/newborns who did not have skilled birth attendant delivery)
- b) Newborns receiving essential newborn care (immediate clean cord care, immediate drying and wrapping, and breastfeeding within one hour from trained facility, outreach, community health workers, or traditional birth attendants)
- c) Newborns receiving antibiotic treatment for infection from trained health workers (newborns identified as having possible infection who received oral or parenteral antibiotic treatment from trained facility or outreach or community health workers)
- d) Antenatal care visits (provided by skilled providers)
- e) Deliveries with a skilled birth attendant
- f) People trained in maternal/newborn health
- g) Women receiving Active Management of the Third Stage of Labor (women giving birth in facilities and homes who received AMSTL by a skilled birth attendant in public and private health facilities, rural and urban health facilities, as well as home births with SBAs. AMSTL is defined as the following three elements:
  - I. Use of uterotonic drug within one minute of birth (oxytocin is the drug of choice, 10 International Unit by intramuscular route is preferred)
  - II. Performance of controlled cord traction
  - III. Performance of uterine massage after the delivery of the placenta

<b>Contributing writers:</b> Doyin Oluwole, Indira Narayanan, Lily Kak, Malay K Mridha, Michel Pacque, Janet Meyers, Nabeela Ali, Robert Clark, Steve Hodgins
<b>Reviewers:</b> Allisyn C Moran, Joy Lawn, Lily Kak, Michel Pacqué, Marge Koblinsky, Neal Brandes
<b>Editors:</b> Malay K Mridha, Suchismita Roy, Badrul Alam
<b>For further information please contact:</b> mothernewbornet@icddr.org



**MotherNewBorNet**  
(Facilitating translation of research for mother-newborn survival)