“BIRTH ASPHYXIA”:

Report of a meeting

Cape Town 29th November to 2nd December 2002

Supported by the Bill and Melinda Gates Foundation through a grant to Save the Children Federation for the Saving Newborn Lives Initiative
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Cover photo credit

Brian Moody

We would like to express our gratitude to the panel members who traveled so far and worked so hard to discuss this important and often neglected problem, and grappled with issues that do not have easy solutions.

LISTING OF PARTICIPANTS DOES NOT CONSTITUTE INSTITUTIONAL APPROVAL OF CONTENTS OF THE REPORT.
Abbreviations

CHW community health worker
EIP Department of Evidence for Information and Policy at WHO
GBD global burden of disease
LBW low birth weight
M&E monitoring and evaluation
MDG Millennium Development Goals
NE neonatal encephalopathy
NMR neonatal mortality rate
PEP Perinatal Education Programme
PMR perinatal mortality rate
PPIP Perinatal Problem Identification Programme
SNL Saving Newborn Lives
TBA traditional birth attendant
TT tetanus toxoid
WHO World Health Organization
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### Conclusion

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Background, Aim and Objectives for the Meeting

Background

“Birth asphyxia”* is a key problem to address in improving newborn survival. It has been estimated to account for approximately one-third of the estimated 4 million neonatal deaths annually (WHO 2001), resulting in a total of over 1 million neonatal deaths, and an unknown number with long-term neurological disability. In addition, 40% of the 3.9 million estimated stillbirths (WHO 2000) are thought to be due to intrapartum hypoxia. Data is lacking, particularly at community level where the majority of asphyxia-related deaths occur.

While neonatal deaths due to infections, particularly tetanus are declining, the limited data available suggests that deaths related to “birth asphyxia” have remained relatively unchanged in the developing world. There is a need to examine reasons for lack of progress in reducing “birth asphyxia” deaths, and to identify available evidence for solutions and models of success in implementing such solutions. Policymakers and program managers must make decisions and implement policies to reduce neonatal deaths and stillbirths. Yet, there is limited high-quality evidence available to guide decision-making and almost no information on cost-effectiveness.

The Saving Newborn Lives (SNL) Initiative recognizes “birth asphyxia” is a complex problem to address, particularly at the community level. Before moving to implement prevention and management protocols in its neonatal health programs, SNL commissioned a detailed assessment of the evidence for “birth asphyxia” burden and interventions at the community level. The key gaps in knowledge identified by this assessment are the basis for a Request for Applications (RFA) for research to be funded by SNL. A number of publications are planned regarding the burden of “asphyxia”, issues in measurement, a review of interventions and current issues at community level.

Although this meeting focused on “birth asphyxia” as a distinct entity, this does not reflect an intention to promote a “vertical” approach to this problem. Solutions are inseparably linked to provision of high quality care for women in pregnancy and delivery, and to community demand for maternal and neonatal services. The intention is to highlight the need for more evidence to address this problem within the context of improving outcomes for women and children, prioritizing gaps in knowledge that limit effective action. Similarly, the emphasis on community level does not imply that solutions at this level alone will work. While the majority of deaths from “birth asphyxia” may occur at community level, the solutions will require effective action at all levels of the health care system, as well as ownership by local and national policymakers.

* The term “birth asphyxia” traditionally refers to a baby who does not breathe at birth. The cause is assumed to be intrapartum hypoxia, or a lack of oxygen during delivery. In this report we will use this traditional meaning, but also discuss some of the limitations of this term. Intrapartum hypoxia causes more stillbirths than neonatal deaths and while not included in the term “birth asphyxia”, these are closely linked in both causes and solutions.
Aim of Meeting

The aim of the meeting was to examine current evidence and program experience regarding “birth asphyxia”, and to discuss program strategies, research priorities and approaches to promote more attention and action for birth asphyxia within the context of maternal and child health.

Objectives

Objectives of the meeting were to:

1. Review the draft document¹ and other inputs from participants covering:
   - The global burden related to asphyxia
   - Evidence for interventions and a model to assist in decision-making to address birth asphyxia in a variety of settings
   - Survey of perceptions, experience and recommendations for advancing community-based interventions for birth asphyxia

2. Agree on recommendations for program action and research priorities, particularly for implementation by SNL

3. Discuss ideas and plans for promoting further action and greater funding to address birth asphyxia, and produce a brief advocacy statement.

Audiences for this Report

This meeting report is not the definitive output of the ongoing assessment of “birth asphyxia” supported by SNL, but reflects discussion at a meeting of invited experts. Much of the discussion was informed by a draft background report which will be published as a series of papers. This meeting summary will be of most relevance to the following audiences:

- Program managers and clinicians involved in obstetric or neonatal care, especially in low resource settings;
- Decision-makers for maternal and newborn care programs; and
- Those struggling with monitoring and evaluation of stillbirths and neonatal deaths related to intrapartum hypoxia and birth asphyxia.

¹ A draft report had been circulated to all panel members before the meeting. This meeting report will not repeat material from the draft report.
Summary of the Meeting

This three-day meeting held in Cape Town, South Africa brought together a group of experts with particular expertise in community level approaches for neonatal health, as well as maternal and child health policy. The major geographical regions were represented, as were non-governmental organizations (NGOs), global agencies and academic institutions. The meeting was sponsored by Saving Newborn Lives, through a generous grant from the Bill and Melinda Gates Foundation. A draft background report was circulated to attendants before the meeting summarizing much of the relevant information.

The primary aim of the meeting was to examine current evidence and program experience regarding birth asphyxia, and to discuss program strategies, research priorities and approaches to promote attention and action to reduce asphyxia-related deaths and disability within the context of maternal and child health.

The meeting started with an overview of terminology related to birth asphyxia, a review of recent estimates of the global burden of disease, and a summary of the approaches being employed to generate the asphyxia estimates for the Global Burden of Disease (GBD) II work (funded by SNL and undertaken in partnership with WHO). Lack of data and lack of consistency in case definitions especially at community level means that the range of uncertainty is wide, particularly regarding estimates of stillbirths and asphyxia-related disability. Previous WHO estimates suggest that intrapartum hypoxia accounts for approximately 1.2 million neonatal deaths, 1.6 million stillbirths (WHO 2000), and an unknown number with long-term neurological disability. Epidemiological studies from Nepal suggest that the case fatality rate due to birth asphyxia is so high that the number of infants surviving with severe disability is lower than previously estimated. The need to clarify case definitions was stressed. Several potential indicators for monitoring “birth asphyxia” in programs were suggested, including fresh stillbirth rate, and will be validated on a large dataset in Cape Town. Consensus of the panel was that the Apgar score was neither of value nor feasible at basic health care level.

The priority of the meeting was to discuss approaches to reach under-served populations with care during delivery as this is the key for reducing intrapartum hypoxia, but also for reducing maternal deaths. The panel agreed that skilled care for all women is a right, and that all skilled attendants at delivery should be trained to competency in basic neonatal resuscitation. Communities and national governments should prioritize the training and mobilization of adequate numbers of skilled attendants, supporting them to work in rural areas. Skilled care during labor and delivery will potentially have the greatest impact on reducing the burden related to intrapartum hypoxia. In addition, essential newborn care, including neonatal resuscitation, should be integrated into Safe Motherhood programs and pre-service and in-service training for midwives where at all possible. As many midwives in less developed settings have little or no competency-based resuscitation skills, and yet have a high case load of deliveries, increasing their abilities should have major impact, and is therefore a priority. There are examples of countries that have already prioritized expansion in skilled midwifery services, and significantly increased coverage, such as Thailand, Sri Lanka and Mozambique.

A simple algorithm was agreed to identify and manage the baby who does not breathe at birth in settings with limited resources. It was recommended that all babies who do not cry and/or do not breathe should be resuscitated, apart from obviously macerated stillbirths. Cardiac massage is not recommended at basic-level resuscitation. The resuscitator should be able to recognize chest wall movement as a marker of effective ventilation. All meeting participants agreed that it should be the norm for skilled attendants to be trained to competency using a resuscitation dummy.
Nevertheless, there are an estimated 61 million deliveries each year to women without skilled care. A few members felt that this problem may be addressed in a decade or less, but others felt strongly that it will take longer not only to train sufficient numbers of skilled attendants but also to build a system to support skilled care, especially in rural areas. Thus, the poorest and most isolated women may be left without skilled care for the longest time unless interim solutions are applied.

A number of potential “add-on” strategies were considered that would allow either the health system to reach out (e.g., improved quality of care in the health facility, strengthened referral systems, maternity waiting homes, mini-maternities in the community with skilled attendants, possibly in combination with traditional birth attendants (TBAs) depending on the local situation) or allow the community to bridge the gap (e.g., birth preparedness approaches, and the use of existing community care systems such as community health workers (CHWs) to link better with the formal health care system). Different approaches will be appropriate in different settings depending on the existing health system and community system capacity and resources. Most of the panel agreed that it was probably inappropriate to start major new training schemes for TBAs, but where TBAs are currently the norm, it was recommended that efforts be made to link them to the system, supporting better care and referral, whilst aiming to ultimately shift to full coverage with skilled attendance. Examples of linkages are available from Malaysia, Indonesia and Brazil.

Agreement was not reached on specific roles for “non-professional” attendants such as TBAs and CHWs, given the lack of evidence and the differing viewpoints of the panel. Panel members from Africa, Asia and Latin Africa reported that a few governments were shifting back towards TBA training, given a lack of other immediate options. Possible suggested roles for TBAs and CHWs included behavior change communication particularly around birth preparedness, facilitating referral, and postnatal home visiting. There are a number of program experiences suggesting that TBAs and CHWs can be successfully taught neonatal resuscitation and that this may reduce case fatality rates for babies who do not breathe at birth, although these are based on small numbers and do not show statistical significance (Kumar R 1999, Bang A et al 1999). Additionally, these examples are from settings with extensive support, involving regular supervision and training. Programs to train CHWs in neonatal resuscitation should not be scaled up until cost-effectiveness is shown. Based on the available experience, selected, well-trained TBAs can resuscitate effectively, but even if a TBA conducts 20 deliveries a year, she will only resuscitate about once a year so the impact will be much lower than possible through a midwife in a facility doing several hundred deliveries a year. Maintenance of competency in resuscitation is complex at such low levels of exposure. Further research is required to evaluate feasible roles for community-level workers, integrating into the health care system. Selection criteria also require investigation.

In conclusion, the panel agreed that asphyxia-related neonatal deaths and disability, as well as the closely associated burden of intrapartum stillbirths, are an important and often neglected problem. The keys to prevention lie within Safe Motherhood programs, with greater coverage of skilled attendants and better access to emergency obstetric care. Neonatal resuscitation skills and basic equipment must be promoted as a norm for the skilled attendant. However, while working towards skilled attendance for all, interim add-on approaches including use of community level workers where locally appropriate are required to improve outcomes for the world’s poorest women and newborns.

Outputs of meeting include:
1. Program advice to SNL regarding intrapartum hypoxia and birth asphyxia;
2. Algorithm for the identification and management of the baby who does not breathe at birth;
3. Asphyxia advocacy piece;
4. Research priorities (request for applications for new research funded by SNL); and
5. Meeting report.
FRIDAY

Welcome

A warm welcome to Cape Town was expressed by Professor David Woods, wishing the participants a fruitful and enjoyable meeting.

Dr. Joy Lawn thanked everyone for traveling, recognizing that by nature of an expert panel many individuals were very busy and had made sacrifices to be at the meeting. The aims and objectives of the meeting were set out (see page 4), and the point emphasized that the desire was not to artificially address asphyxia as a separate issue, but to focus on this large and relatively neglected problem and together to identify ways to generate more attention and action.

Each participant briefly introduced themselves and their interest in the topic of the meeting. It was stressed that input and open discussion was welcome throughout the three days.
Previous estimates of the Global Burden of Disease related to birth asphyxia
[Dr. Joy Lawn]
Previous estimates of birth asphyxia-related burden based on WHO estimates and GBD reports/provisional numbers between 1991 and 2001 were outlined by Joy Lawn (Figure 1 and more details in draft report).

Figure 1. Current information on “asphyxia”- related GBD

(Draft report, Birth asphyxia: to breathe or not to breathe. Lawn J, Darmstadt G, Nov 2002)

The wide range of estimates was emphasized to be a reflection of the lack of data available for numbers of neonatal deaths, and particularly for cause of death. The position for stillbirth data is even worse. Disability data of all categories is lacking at population level and is complicated by both varying definitions of disability (medical versus social models) and by the fact that in most cases, attribution of cause is retrospective.

The need for consistent estimates with transparent methods allowing criticism and refinement was stressed. Given the limited data, there would always be a range of uncertainty, but giving sources, methods, and confidence intervals allows the uncertainty to be seen.

What is “birth asphyxia”? [Dr. Joy Lawn]

The confusion regarding terms has been a problem in assessing both the size of the problem and the solutions. There are several clusters of terms relating to different aspects of birth asphyxia, such as clinical identification and management, or cause, or prognosis or outcome. Much of the confusion comes from the fact that clinical measures such as fetal distress, and “not breathing at birth” were intended to facilitate effective case management and are not for epidemiological measurement of the condition. These clinical measures are not specific predictors of either cause (may be caused by preterm birth, maternal anesthesia, etc.) or of outcome (the baby may have a healthy development or may die). Nor are they easily measured. Conversely, the epidemiological terms such as neonatal encephalopathy (NE) are
more useful for prognosis than for immediate clinical management, and are also complex for measurement, especially at community level.

The important work of Fiona Stanley and Eve Blair of the Perth Unit in Australia in looking at causal pathways for NE was touched upon. Although intrapartum insults are not the only cause of a baby who does not breathe, even in an industrialized setting over half of NE is related to intrapartum insults. In developing countries with inadequate access to quality emergency obstetric care, intrapartum insults are probably the major preventable cause of babies with asphyxia-like clinical presentation.

The need for case definitions at all levels was emphasized, although the reasons vary by level of the health care system.

1. Individual level of care:
   The birth attendant and other health care providers caring for women during childbirth must be able to identify the fetus with intrapartum hypoxia or the newborn with “birth asphyxia” in order to manage the pregnancy, delivery, newborn care and follow-up for potential disability, using standard, evidence-based guidelines.

2. Population level:
   Program managers and policy makers must use a consistent case definition to allow comparison of “birth asphyxia” outcomes and care by population characteristics such as poverty, or by time, and to carry out audit and to reduce avoidable deaths.

3. Research and policy:
   To advance prevention and management of “birth asphyxia”, epidemiologists and scientists require a case definition to ensure comparability of results and conclusions.

It was suggested that case definitions be used according to purpose. For example, if simple clinical care at birth in the community is the purpose, then the “non-breathing baby” may be the most appropriate definition. However for measurements of the burden, the focus should be on outcomes following intrapartum hypoxia, especially intrapartum stillbirths, and related neonatal deaths and disability. In settings with higher coverage of skilled institutional delivery, measure of neonatal encephalopathy may be appropriate, but at community level assessment of NE is only really feasible in research studies.

Discussion:
The ACOG statement in 1993 recommended that “birth asphyxia” not be used as a term, and only those babies with neonatal encephalopathy (NE) and proof of intrapartum complications should be considered as having acute intrapartum complications. The panel discussion suggested that this very qualified approach to diagnosis referred more specifically to settings where litigation is a reality, and other factors made this less appropriate to developing country settings as follows:

- intrapartum hypoxia may well be a bigger problem in developing countries, given low coverage with skilled attendants at birth and limited access to emergency obstetric care
- where resuscitation is not available or may be ineffective, a significant proportion of deaths occur immediately after birth, without manifestation of neonatal encephalopathy
- many babies with neonatal encephalopathy may not be identified in developing country settings

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the investigations required to definitively prove intrapartum complications such as continuous fetal monitoring and fetal blood gas or cord pH monitoring are not available for most deliveries.

The term “birth asphyxia” will continue to mean many things to many people and David Woods and others stressed the need to always define what we are referring to during the meeting and also in regular practice.

To add confusion, it was noted that definitions of birth asphyxia vary by audience such as within WHO where there is a clinical definition (“The failure to initiate or maintain regular breathing at birth”) and a GBD definition based on ICD-10 coding which is more specific and including birth trauma.

Some time was spent discussing the uses and abuses of the Apgar score as either a clinical measure, or a prognostic measure. The consensus of the group seemed to be that at first level of care, the Apgar is very poorly scored, so much as to be meaningless, and probably does not add to either clinical or prognostic value. Dr. Matthew Ellis suggested that where skills are more developed, the health care personnel could be trained to use a simplified score for neonatal encephalopathy instead. He also suggested that the score may be simplified further for community level, focusing more on ability to suck over the first few days of life.

**Action points:**

1. When using the term “birth asphyxia,” be sure to clarify if this is a clinical definition (such as not breathing at birth) or what is meant by the term.

2. Consensus seemed to be that the Apgar score was of limited feasibility at basic health care level

3. Part of the ongoing work of the assessment of “asphyxia” should be to set out recommendations for case definitions that apply and are feasible in developing countries. This should include several groups of definitions:
   - Simple clinical identification
   - Feasible indicators for use to monitor outcomes related to intrapartum hypoxia in programs [David Woods offered to undertake initial validation of some indicators such as fresh stillbirth rate using the Perinatal Problem Identification Program and local perinatal audit data]
   - Possible case definitions for academic studies of asphyxia-related outcomes in developing country settings.

4. A priority for the meeting should be to work on a simple clinical algorithm to aid identification and management of the non-breathing newborn.

5. The group agreed that disability data is a major gap. Dr. Zulfiqar Bhutta has some community-based data from Pakistan that should be available shortly. The Johns Hopkins/ICDDRB group will also collect data as part of a large community-based intervention trial in Sylhet, Bangladesh.

**Variation of the incidence of Neonatal Encephalopathy, CFRs and disability based on Nepal studies**
[Dr. Matthew Ellis]

Kathmandu encephalopathy study was a prospective cohort study (1994-98) with recruitment over an 18-month period and follow-up to 1 year. Neonatal encephalopathy was elected as being the most specific marker of asphyxia insult. A total of 131 neonatal encephalopathy cases were identified from
22,000 term hospital deliveries. Age matched controls were selected (2:1), with unmatched controls (3:1). Identified cases of sepsis, congenital abnormalities and hypoglycemia were excluded. The context was a Government Maternity Hospital with 15,000 deliveries per year and a good supply of water, electricity, and oxygen as well as 24-hour operative maternity care. Neonatal care was level II special care, providing suction and bag and mask resuscitation, intravenous antibiotics, thermal care, baby friendly, but no long-term ventilation. Deaths were investigated by verbal autopsy. Developmental follow-up was with Denver screening at 1 year (examiner blind to neonatal encephalopathy status). Having a reduced head circumference at 6 weeks was found to be a sensitive and specific predictor of poor developmental outcome.

Table 1. Comparison of findings in the Kathmandu and the Perth neonatal encephalopathy studies

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<tr>
<td>Prevalence of neonatal encephalopathy</td>
<td>6.1/1000</td>
<td>3.8 / 1000</td>
</tr>
<tr>
<td>Case fatality rate</td>
<td>30%</td>
<td>10%</td>
</tr>
<tr>
<td>Intrapartum risk factors</td>
<td>60%</td>
<td>&lt; 30%</td>
</tr>
<tr>
<td>Prevalence of fresh stillbirths &gt;2000g</td>
<td>10/1000</td>
<td>1 / 1000</td>
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The incidence of neonatal encephalopathy was found to be higher than recorded in industrialized settings. There was a higher proportion of cases with grade 3 severity of neonatal encephalopathy, and the case fatality rate was 3 times higher than in Australia (Table 1). However the rate of infants surviving with severe disability was at most 1 per 1,000 due to the high proportion that died in the first days of life (Figure 2).

Figure 2. Outcome of cases of neonatal encephalopathy according to grade of severity in the Kathmandu neonatal encephalopathy study

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Discussion emphasized the abuse of oxytocin. In the Kathmandu study, induction with oxytocin in hospital but with inadequate monitoring was associated with an odds ratio of 9.09 (3.32-24.83). Abuse of oxytocin has been reported at community level in several Latin America studies and seen in program experience in Africa. Members of the panel felt that this was a dangerous abuse in the absence of appropriate monitoring and skilled care and was likely to be an important contributory factor to intrapartum hypoxia.

**WHO Global Burden of Disease efforts regarding the neonate**

[Dr. Jelka Zupan]

Dr. Zupan outlined the work of the WHO in its normative role regarding estimates for the peri- and neonatal period. Current relevant work involves:

1. Estimating the number of neonatal deaths globally, working up from country level. This work is in conjunction with the Department of Evidence for Information and Policy (EIP) at WHO and is anticipated to be completed during 2003.

2. Re-estimation of the perinatal mortality rate (PMR) by country, including stillbirths and early neonatal deaths, although the rates will be released as perinatal mortality rate and neonatal mortality rate as per the 1996 publication, “Perinatal mortality: a listing of known information”. Stillbirths are not in the GBD so the PMR estimation is a separate process.

3. Estimation of the GBD as part of the GBD 2000 project for a number of specific cause in the neonatal period including:
   - “Perinatal causes” which include asphyxia, preterm birth, low birth weight (LBW) and “other perinatal”
   - Neonatal tetanus
   - Congenital abnormalities
   - Congenital syphilis and other perinatal infections

4. Ongoing work to strengthen health systems, and give guidance on indicators.

For mortality rate estimations, data sources for this include population-based and facility-based data within the last 10 years. Around 100 countries have PMR data (60% of the world’s births) and around 151 (80%) have neonatal mortality rate (NMR) data. For the remaining countries, rates are based on modeling approaches, usually using infant or under-5 mortality rates. Time trend discussions are fraught with complexity as input data and estimation methods vary with time and so uncertainty is high.

PMRs have the advantage of avoiding misclassification bias between stillbirths and early neonatal deaths, which are especially important outcomes for birth asphyxia. Wigglesworth is probably the most widely used classification system, although there are many variants.

Dr. Zupan explained that the term “perinatal causes” as applied in ICD does not relate to the perinatal period, or include stillbirths, but refers to causation arising in the perinatal period and includes birth asphyxia/birth trauma listed above. Deaths related to these causes usually occur within the first week, when indeed around 70% of neonatal deaths occur. The majority of birth asphyxia deaths are in the first 1-2 days. Time trends by cause have even wider limits of uncertainty.
Discussion focused on the confusion of the term “perinatal” related to causes in ICD and even regarding PMRs, where several time periods are applied. There are advantages in the PMR, but also considerable confusion regarding the use of the word perinatal.

The Global Burden of Disease of “birth asphyxia”
[Dr. Joy Lawn]

The primary focus of the panel meeting was program strategies rather than methods to assess the GBD. Part One in the draft report outlines the status of the GBD estimation, which was emphasized to be a work in progress, due to be submitted to EIP at WHO in 2003. The outcomes to be estimated include:

- Intrapartum (fresh) stillbirths
- Asphyxia related neonatal deaths
- Asphyxia-related disability

The estimation is being based on the best data available by setting as outlined in Table 2.

**Table 2. Summary of settings used for estimation of the Global Burden of asphyxia-related outcomes**

<table>
<thead>
<tr>
<th>Setting</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
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<tr>
<td>Regions</td>
<td>Amr A</td>
<td>Amr B</td>
<td>Amr D</td>
<td>Afro D</td>
</tr>
<tr>
<td>(countries)</td>
<td>Eur A</td>
<td>Eur B</td>
<td>Emro B</td>
<td>Afr E</td>
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<tr>
<td></td>
<td>Wpr A</td>
<td>Eur C</td>
<td>Sear B</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Wpr B</td>
<td>Sear D</td>
</tr>
<tr>
<td>NMR per 1000 live births</td>
<td>(34)</td>
<td>(51)</td>
<td>(47)</td>
<td>(62)</td>
</tr>
<tr>
<td>&lt;10</td>
<td>10-19</td>
<td>20-39</td>
<td>&gt;40</td>
<td></td>
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<tr>
<td>Percentage of estimated global neonatal deaths</td>
<td>&lt; 1%</td>
<td>4%</td>
<td>18%</td>
<td>76%</td>
</tr>
<tr>
<td>Information sources for asphyxia-related neonatal deaths</td>
<td>Vital registration</td>
<td>Vital registration ~ 50% countries Modeling on VR cause-specific rate for remainder</td>
<td>Method 1. Based on literature Method 2. Extrapolation from VR data Method 3. Multiple regression model (in progress in partnership with EIP)</td>
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<tr>
<td>Information sources for asphyxia-related severe disability</td>
<td>Disability registers Population-based studies</td>
<td>Limited population-based studies Historical data from Setting A</td>
<td>Limited population-based studies Historical data from Setting A</td>
<td>Limited population-based studies</td>
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In Settings C and D with the least available cause-specific data, three different methods are being used to estimate the number of asphyxia-related deaths. These three methods will be triangulated and the final result published with confidence intervals. The results will be available in 2003. Individual input was invited from those on the panel who were interested.
Identification and management of a baby who does not breathe at birth

Three main categories of babies at birth were identified:

1. Macerated stillbirth
   - This baby can be recognized as being stillborn, with broken skin, no cry and no breathing. If the attendant has the ability to measure heart rate, the heart rate should be assessed and its absence recorded in the record.
   - Resuscitation is not appropriate and the focus should be on support for the mother.

2. Normal healthy baby who cries and is breathing regularly
   - This baby should be dried immediately with a dry, clean cloth and placed skin-to-skin on the mother for warmth, with support given to promote early feeding.
   - Suction is not appropriate unless there is thick meconium staining of the liquor.
   - Close observation over the crucial first hour of life can be provided in partnership with the mother who should report any change in breathing or activity.

3. The baby who does not cry at birth, and is not breathing regularly or is gasping (note that this category may include fresh stillbirths).
   The following actions should be carried out even if the baby appears very premature:
   - If thick meconium staining of the liquor is present then the baby’s mouth and airway should be suctioned.
   - Dry the baby immediately and vigorously using a dry clean cloth. This action will take almost one minute to carry our thoroughly.
   - Every baby should be vigorously dried, regardless of meconium staining.
   - Reassess the baby at 1 minute (essentially when dried) and if the baby has not cried and is not breathing regularly or is gasping, then begin to ventilate using a bag and mask. Bag ventilate at a rate of between 40 and 60 per minute. Using air is acceptable as a starting point for all babies if oxygen is not readily available.
   - Evaluation of heart rate to differentiate a fresh stillbirth from a baby with severe asphyxia but a very slow heart rate is not necessary or feasible.
   - Cardiac massage is not recommended at basic level resuscitation.
   - The resuscitator should be trained to competency using a dummy to practice and able to recognize chest wall movement as a marker of effective ventilation.

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3 The panel did not recommend the use of the tube and mask device for the reasons outlined below.
The above algorithm is consistent with WHO and SNL guidelines both broadly and in detail, apart from recommending that the tube and mask device should not be used. 7

Equipment required:
- Soap to wash the hands of the attendant before delivery
- Clean cloth for drying the baby (ideally warmed)
- Another cloth to wrap the baby in
- Self inflating bag and mask
- A suction device
- Watch/clock
- Warmth and light
- Oxygen (although lack of oxygen should not stop resuscitation)

The panel was unanimous in not recommending the tube and mask device for the following reasons:
- It is very tiring and unpleasant for the user as the resuscitator has to provide the ventilatory effort by blowing. In the Massawe A et al8 trial, the rate of ventilation by the nurses in Tanzania could not be kept above 20 because of the effort required. This is too slow for effective resuscitation.
- The regulation of pressure is determined by the user, with no blow-off valve for safety, although the tendency is probably towards inadequate pressure.
- The device is not widely available. In fact, the Swedish manufacturer has stopped making it. Now that bag and mask are mass produced in countries such as India for around $6.00, the cost differential is not great, which was the original major benefit.

Ethical questions discussed:

1. What advice should be given regarding which babies not to ventilate, especially at a basic level of care?

Consensus was that it was unrealistic to teach a basic level health worker to make complex moral judgments and that most babies who would be disabled would not survive without intubation and ventilation, which would be unavailable. All babies except macerated stillbirths should be resuscitated at this level. For healthworkers with more skill, or in team settings, then infants who can be distinguished with severe and obvious lethal congenital malformations should not be recommended for resuscitation.9

2. What advice should be given regarding when to stop active resuscitation and will resuscitation result in more disabled survivors?

Based on the available evidence, Dr. Ellis suggested that severe disability would occur only in babies who developed severe encephalopathy, and that without intensive care, most of these babies would die. The issue is therefore how long to ventilate with a bag and mask. An arbitrary cut off of 20

minutes was suggested in line with conventional resuscitation guidelines. This suggests that in the absence of intensive care, many additional survivors with disability would be unlikely.

Several panel members, including Elizabeth Bocaletti and Joseph de Graft-Johnson, emphasized that this was an important barrier to address in people’s minds as the consequences of long-term disability, especially in settings with little support are huge, and the fear of generating more disabled survivors is a blockage in implementing resuscitation programs.

The question left was whether intensive care, particularly if applied with limited quality, would result in a higher rate of disabled survivors as was initially seen in industrialized countries. This was a concern for many on the panel, particularly given the lack of monitoring of long term outcome. However, it was not felt to be central to the issues of the meeting and more relevant to transitional countries, or to the middle class of countries starting neonatal intensive care, such as India.

Questions discussed that the panel felt there was inadequate evidence to answer:

1. The exact time to commence ventilation. Dr. Zupan stressed that the time of around 1 minute given by ILCOR is based more on practice (the time taken to dry the baby) rather than evidence that this is the optimum time to start ventilation.
2. The role of suctioning in meconium staining of the liquor that is not “thick” and where the baby is already breathing spontaneously.
3. Use of oxygen. ILCOR recommends immediate use of oxygen, when available, with resuscitation. The studies by Saugstad et al suggest that for many babies, resuscitation with air may be adequate, but larger studies are required to answer this definitively.  

Review possible add-on strategies to reach the under-served
[Dr. Joy Lawn and extensive general discussion]

The draft report details the published literature regarding impact of eight potential add-on interventions to improve services for the under-served, especially at community level where the majority of neonatal and indeed many maternal deaths occur. Where available, the cost is also compared. Examples of program experiences are also given. The 8 interventions reviewed were:

1. Birth preparedness (or Emergency preparedness)
2. Trained TBAs
3. Home-based care by CHWs
4. Skilled attendants in birthing centers in the community
5. Prediction of requirement for emergency obstetric care / neonatal resuscitation
6. Maternity waiting homes with immediate access to emergency obstetric care
7. Systematized neonatal resuscitation
8. Perinatal audit

A brief summary of impact and available cost data for each intervention was presented. The details are in the Draft Report presented to the panel and will be published later. General points made were as follows:

- The evidence is limited and the title for this section of the report could be rephrased to reflect the limited evidence and to include program experience to avoid over-interpretation.

- The emphasis in the review was to look at strategies or approaches that could be added to the existing health care system to strengthen prevention/management of intrapartum hypoxia and its complications while working towards skilled attendance for all. None of these strategies, as emphasized in the report, are appropriate as “stand alone” interventions. Grouping these under the word “interventions” may be misleading and using a term such as “add-on” strategies may be more appropriate, emphasizing the systems approach and the long-term goal.

- Many of these approaches are traditionally under the Safe Motherhood umbrella of responsibility, by nature of the fact that addressing intrapartum hypoxia is directly related to care during delivery. However it was felt that discussion of them and supporting Safe Motherhood messages as a win-win for woman and baby was appropriate. While approaches such as Maternity Waiting homes were reviewed in 1996, there has been limited implementation especially in Asia and, therefore, there is scope to work together on wider use where appropriate.

Some specific issues were raised as follows:

1. Birth preparedness means many things to different groups. The WHO uses the term to mean a plan set by the pregnant woman and her family to address emergencies, should they occur. JHPIEGO/MNH program and many PVOs such as Save the Children and CARE and the AVMDD program use the term to refer to preparedness at all levels, including family, community and facility.

2. Trained TBAs. This topic generated major discussion. Some members felt strongly that TBA training was not appropriate to discuss at all, others felt that this reflects the current reality for many communities.

There was broad agreement with the goal to provide a skilled attendant and an enabling environment for all pregnant women. There was also a widespread feeling within the group that while TBAs are not and could not be skilled attendants, they are present at birth for a significant proportion of the world’s women. Even with increased number of skilled attendants being trained it would be some time, even decades, before many women in rural communities would have access to skilled care.

Shifts in country policies regarding training of TBAs in various regions were discussed:

- From Africa, Dr. Joseph de Graft-Johnson reported that in the mid to late 1990s, government policy in a number of countries (Malawi, Ghana, Zambia, Ethiopia, Nigeria) was to discourage TBA training. However, some countries were now reversing this policy as a vacuum had been left at community level that could not yet be filled with skilled attendants especially in remote rural areas.

- Dr. Elizabeth Bocaletti added that a similar shift in policy had occurred in a number of Latin American countries, having moved away from TBA training, they were now reconsidering roles for TBAs.
• Dr. Rajesh Kumar and Dr. Abhay Bang both reported that in India, after the government stopped funding and encouraging TBA training, the matter was even discussed in parliament and now the pendulum has swung back towards TBA training and funding CHW packages.
• Dr. Ornella Lincetto reported that, following recent reviews of the limitations of TBAs programs in reducing maternal and perinatal mortality, in some countries, including Making Pregnancy Safer spotlight countries (e.g., Indonesia, Bolivia, Sudan, Mozambique, Nigeria, Uganda), national policies prioritized increased access to skilled care, leaving the role of supporting TBAs to the NGO community.

This discussion reflected a perceived tension between long-term global priorities to increase skilled attendance and the reality of the current lack of skilled attendants, especially for poorer, remote communities. Many of the panel expressed a need for a menu of options for the policy maker or program manager in this situation. The options are wider than just training TBAs and may include “mini-maternities,” where TBAs perform deliveries with a skilled attendant linked to an Emergency obstetric care facility. Effective use of TBAs is not a quick, easy alternative, but also involves time in training and support. Judith Moore emphasized that unreasonable expectations were often made of unsupported TBAs. Identifying feasible roles such as assisting in birth preparedness, or facilitating referral using mobile phones, as shown in a program experience from Rwanda recently, may be more realistic.

Further discussion emphasized the fact that while national policy shifts in some cases may show a re-engagement with TBAs, the feasible roles for TBAs vary dramatically, even within countries, in terms of their skills, their case load and the support and links provided. In most settings, TBAs perform few deliveries per year and more than 20 would be considered a high case load. Hence, even if TBAs can be trained and supported to a high level of skill, if the average TBA is performing even 30 deliveries a year, only 1 and 2 babies will require resuscitation in an average year and this is not enough to maintain competency-based skills or to be cost-effective. In contrast, a health facility with several thousand deliveries a year allows a few skilled attendants to be trained and have large impact using one or two sets of resuscitation equipment. Each TBA would have to maintain functional resuscitation equipment at all times, as opposed to a health facility where one or two sets of equipment in the delivery room can serve a large number of deliveries. There are many as yet unanswered questions regarding impact, cost-effectiveness and sustainability, and this was seen as a research priority by most of the participants.
SUNDAY MORNING

Major findings from the “birth asphyxia” survey
[Dr. Gary Darmstadt]

Given the paucity of information to guide decision-making, SNL decided, as part of the “birth asphyxia” assessment, to carry out a survey of experts in the field of international maternal and newborn health as well as clinicians and program managers working in maternal and newborn health in low resource settings. The overall goal of the survey was to obtain current information with regard to programs and practices to address and monitor the problem of birth asphyxia, encouraging input and dialogue from those in the field to prioritize further action and research.

The objectives of the survey were to identify:

1. Interventions that are in use at community level to prevent and manage birth asphyxia;
2. Effective and feasible ways to recognize individual babies with birth asphyxia and to monitor birth asphyxia in the community;
3. Impressions regarding the appropriateness and effectiveness of using TBAs and CHWs in resuscitation and newborn care;
4. Data, lessons learned and policies relating to birth asphyxia that may not be available through usual search mechanisms;
5. Perceived gaps in programmatic implementation of proven interventions for asphyxia, especially at community level; and
6. Perceived gaps in knowledge which limit the prevention, recognition and management of asphyxia especially at community level.

People responding to the survey included 173 individuals from 32 countries and all major regions of the world. Experience ranged from community- and facility-based care providers, program managers, national and global policy makers to researchers. The respondents were to some extent self-selected, however, this enabled the opportunity to examine what are currently some of the best programs involved in addressing “birth asphyxia”.

Perception of asphyxia among this already interested group was that asphyxia is a major cause of fetal and neonatal mortality. Almost all respondents (96%) reported that asphyxia is “very important”, “important” or “probably significant but data is lacking”. Officials from global agencies were most likely to identify asphyxia as a very important problem, and a significantly higher proportion of individuals from industrialized countries perceived asphyxia as very important compared to those from developing countries. Respondents from sub-Saharan Africa perceived asphyxia as causing a higher proportion of neonatal deaths than those from other regions. Program action addressing asphyxia was significantly more likely from those perceiving asphyxia as a very important cause of neonatal mortality and stillbirths; those who considered it as “probably significant but data is lacking” were the least likely to act.

Policies at national level related to newborn survival were reported to exist in 20 of 27 developing countries, although there were inconsistent answers within 8 countries. Over half of the countries with a policy had a target for reduction in perinatal and/or neonatal mortality, and approximately one-third also specified asphyxia as a priority. Lack of information on neonatal mortality and regarding effective interventions were the most common reasons given for not having a national policy. Given that 14% of these selected and motivated respondents were unaware of whether a national policy existed for their
country, and many more were unclear of the content, it is apparent that if such policies are to be effective, better dissemination is required.

**Program experience** varied from large systems with several integrated levels of care, to simple stand-alone community projects. Most respondents (88%) were actively engaged in programs to address asphyxia, probably a reflection of the highly selected population. Although some priority interventions were specific to the newborn, particularly neonatal resuscitation training (44% of replies), most were components of maternal health programs, notably training of skilled birth attendants, which was the most commonly reported program activity overall (56% of replies). More community-based interventions such as birth preparedness and training of traditional birth attendants (TBAs) were being implemented in less than one-third of programs represented. Provision of neonatal care and referral of asphyxiated babies were part of less than 10% of programs.

**Program recommendations for identification of asphyxia** at community level were clear, with the most feasible and useful methods of recognition being not crying or not breathing at birth. Less than half of the respondents reported regular collection of data regarding asphyxia. Most revealed struggles with identifying asphyxia and collecting meaningful information to guide decisions about asphyxia interventions at the community level, reflecting the recurrent theme of poor information at all levels. Identification of fresh stillbirths and onset of convulsions in the first 24 hours of life were identified as potentially valuable indicators. Apgar score and identification of Neonatal Encephalopathy were not thought to be feasible at community level. Clearer definitions, indicators and models for routine collection of useful data at program level are required.

**Program recommendations interventions** at community level during pregnancy included antenatal care and birth preparedness, communication of danger signs to families, TBAs and community health workers (CHWs), and basic obstetric care. The highest scoring intervention during labor and delivery, however, was essential newborn care, although whether this will reduce asphyxia-specific deaths is debatable. Neonatal resuscitation, maternal risk factor assessment and strengthening of the referral system were also identified as highly useful, but feasibility was lower. Maternity waiting homes and community first aid for obstetric emergencies were perceived to be less useful and considerably less feasible. Behavior change was revealed as a major gap, as only a quarter of the behaviors in the home identified as contributing to asphyxia and amenable to change were being addressed. Chief among these were unsafe practices at home during pregnancy and delivery and delay in recognition of birth asphyxia by families.

**Training and role of TBAs AND CHWs**

One-fourth of respondents had experience in training of TBAs or CHWs. There was a clear consensus on the tasks useful and feasible for TBAs and CHWs, notably assisting with delivery and providing immediate essential care of the newborn, including drying, warming, and clearing the mouth with a clean cloth. Other interventions, including suction with a mucus extractor (Richards SR 1994) or resuscitation with bag-and-mask were thought to be useful, with moderate feasibility. Tube-and-mask resuscitation was rated very low for feasibility, lower than for mouth-to-mouth resuscitation (Massawe A et al 1996). The most appropriate interventions for the asphyxiated baby were considered to be drying and warming, feeding breast milk (either at the breast or expressed), and referral.

In conclusion, this survey highlights the wide range of actions required from all involved along the pathway to survival, including the mother, the community, community health workers, health professionals and policymakers. Although the respondents represent some of the key programs currently addressing birth asphyxia, major gaps in current implementation are revealed. Most programs are focusing on training skilled attendants and newborn resuscitation, with little focus where most deaths occur at the community level.
Lessons learned from South African experience in addressing avoidable causes of death and in distance learning to improve practices

[Professor David Woods]

South Africa estimates the neonatal mortality rate (1000g or more) at 11 per 1000 deliveries according to Perinatal Problem Identification Programme (PPIP) data (Saving Babies Report 2000) which includes ~30% of births nationally. The PPIP is health-system based with 27 sentinel monitoring sites covering 123,508 births resulting in 2,281 stillbirths and 1,321 neonatal deaths (of 1000g or more). Western Cape Province of South Africa has a neonatal mortality rate of 5 / 1000 with a range from 4.6 to 11.5 /1000, and LBW rate = 19.4%, according to PPIP data.

Prospectively identified cause of death data includes Primary (obstetric) causes of perinatal death and Final (neonatal) causes of neonatal death. Emphasis is placed on identifying avoidable factors, which are categorized as patient related, health worker related or administration related.

Major obstetric causes of perinatal deaths in South Africa, according to the Saving Babies report are spontaneous preterm labour, antepartum haemorrhage and intrapartum hypoxia. Intrapartum hypoxia as a cause of perinatal deaths (both stillbirths and early neonatal deaths) varies significantly by setting as follows:

- Metropolitan 9.9% of perinatal deaths
- City and Town 15.3%
- Rural 24.5%

Neonatal causes of death include immaturity-related, infection and perinatal hypoxia. These causes also show variation by setting as follows, with a much higher proportion of hypoxia related deaths in rural areas:

- Metropolitan 31.9%
- City and Town 29.1%
- Rural 41.5%

The Peninsula Maternal and Neonatal Service had 29,000 deliveries in 2001 with 254 neonatal deaths of 500g or more. Major causes of neonatal deaths were:

1. Immaturity related 55%
2. Perinatal hypoxia 15%
3. Congenital abnormalities 14%
4. Infection 7%
Perinatal hypoxia was identified as a priority with a higher proportion of avoidable factors. Avoidable factors in neonatal deaths due to perinatal hypoxia in the Peninsula Maternal and Neonatal Service included:

1. Delay in seeking medical attention during labour
2. Fetal distress not detected
3. Fetal heart rate not monitored
4. Lack of transport
5. No intervention for prolonged 2nd stage of labour
6. Partogram not used correctly

Interventions were instituted to address these avoidable factors and to reduce death due to perinatal hypoxia. Interventions included development of an integrated regional service with referral criteria and protocols, residential advanced courses and a distance learning course, the Perinatal Education Programme. This is a self-help course to enable health workers to manage their own continuing education; provides cheap, practical, appropriate, and sustainable instruction, and promotes problem-solving. There is no need for formal tutors. Health workers do not have to leave home or place of employment. So far, 30,000 nurses, doctors and medical students have been trained. This constitutes about half of South Africa’s midwives.

Perinatal Education Programme manuals include:
1. Maternal Care manual
2. Newborn Care manual
3. Perinatal HIV/AIDS manual
4. Primary Newborn Care manual
5. Saving Mothers and Babies manual
6. (Mother and Baby Friendly Care manual)
7. (Genetic Disorders and Birth Defects manual)

So far, South Africa has made progress in the audit cycle in addressing intrapartum hypoxia, in determining neonatal mortality rates, identifying causes of neonatal death, documenting avoidable factors, developing methods of addressing the problems and demonstrating improvements in knowledge, skills and service. The remaining step is to assess changes in mortality rates.

Program implementation
Chair person: Nabeela Ali

Small Group Session 1. Group A
Program implementation in settings with a reasonable proportion of births in a health facility

Group members
- Stella Abwao,
- Nabeela Ali
- Kent Bream (Rapporteur)
- Joy Lawn
- Judith Moore,
- Dharmapuri Vidyasagar
- David Woods
- Jelka Zupan (Group leader)
Tasks
Take the program setting where ~50% of deliveries occur in the health facility:

1. **What are the components of a maternal/neonatal program which are possibilities for reducing intrapartum hypoxia / birth asphyxia, depending on the situation?**
   
   For example:
   - Neonatal resuscitation
   - Birth preparedness
   - Strengthening skills in intrapartum management
   - Audit of avoidable deaths

All these were considered to be important components within a functioning system. In order to discuss how to fit these together to provide a continuum of care, there needs to be certain pre-requisites, including:

1. Functioning health system
   - Support for the health facility, particularly the part of the system for managing referrals. Ratio of facilities to population according to Safe Motherhood recommendations
   - Skilled attendance, adequate skilled staff (ratio as per cost-effectiveness recommendations in Costing of the Mother-Baby package, where one midwife should do at least 200 deliveries per year)
   - Protocols and standards for care, based on adaptation of international guidelines such as Management of Complications in Pregnancy and Childbirth (WHO, 2001) and forthcoming Management of the Newborn with Problems (WHO, 2003)
   - Supply logistics that are functional
   - Infection control
   - Record keeping

2. Promotion of care-seeking by the woman (birth preparedness)
   - IEC for family and community regarding choice of skilled care
   - Birth preparedness re contingency plans over emergencies
   - Welcoming Facility
   - 24-hour availability

3. Good management of “normal labour”, and early recognition of complications
   - Early recognition and action
     - level-specific tools and protocols
     - routine use of partogram
     - equipment - doplone
     - communication of problems up system
     - protocols for action
   - Companion person for mother
   - Efficient facility triage of patient
   - Intervention for both maternal and fetal indications-(c/s)

4. Care of the Baby at birth
   - Obstetric services in communication with newborn care/pediatric services
   - Essential Newborn Care
   - Resuscitation skills taught to all who have primary responsibility for immediate care of the newborn. This may include the delivery assistant but the priority is to have one skilled person at every delivery
   - Post-resuscitation care (towards normality)
2. How should these be operationalized in the program?

Given that the majority of births are in facilities in this setting, it was felt that the priority should be to improve the quality and family-friendliness of care in the facility and to promote more use of the facility from the community.

No program can institute all the above at once. Local priorities have to be set to build the program bit by bit, focusing on long-term principles such as locally adapted guidelines, competency-based skills, improving referral systems, strengthening supply logistics. Audit is recommended as a tool to help refine the system according to local problems and capacity.

3. Are there things that should not be done? E.g., suction of well babies.

Do not:
• Separate mother and baby without medical indication
• Inappropriately use oxytocin
• Routinely bathe the newborn

4. What are the key outcomes and process indicators?

Outcome Indicators
• Intrapartum Deaths, Failed Resuscitation, Fresh Stillbirths, All stillbirths, All neonatal deaths
• Maternal deaths and Near Misses
• NE rate or surrogate, e.g., first 24 hr convulsions (requires validation of sensitivity and specificity)

Process Indicators
• Fetal Heart Rate at onset of labor and outcome of baby
• Outcome of resuscitation (at least at discharge although ideal would be longer-term follow-up)
• Record Keeping: Neonatal Record- tool audit, Maternal record, Ward record
• Record Audit
• Reliable Death Record

5. What are the priorities for research in this setting?

• Long term outcomes - by promoting wider application of resuscitation, are we causing disability?
• Tools to promote effective triage at health facility level
• How best to promote use of facilities?
• Valid tool for perinatal audit (assess first 24 hr deaths, >2000g)

Other discussion
Discussion focused on the “who” of immediate care of the newborn. While this should be the skilled attendant, it is recognized that in many settings there is another, often less skilled person assisting the skilled attendant at the time of delivery and that this person often has primary responsibility for the baby while the skilled attendant is focusing on the mother. Dr. Nabeela Ali said that in Pakistan this person is usually the tea lady. The question is whether this individual should be trained as they are providing care, or whether the system should be re-focused to enable the skilled attendant to provide this care. The group did not agree on a general recommendation for this, and suggest that this decision should be taken locally.
Small Group Session 1. Group B  
Program implementation in setting where virtually no deliveries occur in the health facilities

Group members

- Abhay Bang
- Zulfiqar Bhutta
- Elizabeth Bocaletti
- Gary Darmstadt
- Rajesh Kumar
- Joseph de Graft-Johnson
- Matthew Ellis (Rapporteur)
- Dr. Ornella Lincetto

Tasks

Take the program setting where virtually no deliveries occur in the health facility and access to skilled care is currently not available for women in labour:

1. What are the components of a maternal/neonatal program which may reduce intrapartum hypoxia/birth asphyxia in this setting in the interim? E.g., Birth preparedness, CHWs, TBAs.

Aims of the program:
- Outcome goals are to reduce stillbirths and neonatal mortality rates as well as maternal deaths.
- Process goals are to increase care with skilled attendance at birth.

Components of the program should include:

Antenatal: Behavior change, particularly “birth preparedness”
- Prevention/management of anemia
- Provision of iodine (national policy re: iodized salt)

Intrapartum: Access to a skilled attendant
- Availability of emergency obstetric care
- Functional referral system if required

Postnatal: Essential newborn care including resuscitation

Core competencies include:
- Competency-based clinical skills such as care during labor and neonatal resuscitation
- Recognition of danger signs
- Effective behavior change

Operationalization of the program at community level is where the problem lies. There a variety of players in different settings including:
- Skilled attendant
- CHW
- TBA (who may vary from an individual who does occasional deliveries to a very experienced attendant)
The local situation should be evaluated. If there is an existing strong community health system, this can be utilized both for behavior change and care. If there is not an existing strong community care system, it is debatable whether this is the appropriate first investment.

Whatever is decided to be locally appropriate, the priority should be to move to a long term goal of skilled care for all women in labor, with resuscitation available for all newborns. Linkages between community and formal health care system are vital to using the strengths of both.

2. **Are there things that should not be done? E.g., home care of babies with neonatal encephalopathy.**

   Programs should not be set up without consideration of the crucial link between the community and the health system.

3. **How can the program ensure that women will be able to have access to skilled care sooner rather than later. E.g., how to move forward to full coverage care with skilled care.**

   It is important to keep this long term goal in mind and to seriously question short-term decisions that may not build towards this.

4. **What are the key outcomes and process indicators?**

   **Outcome Indicators**
   - Total births
   - All stillbirths and fresh stillbirths
   - All neonatal deaths
   - Other potential surrogate indicators to mark NE

   **Process Indicators**
   - Percentage of deliveries with a skilled attendant
   - Percentage of deaths with verbal autopsies

5. **What are the priorities for research?**

   - Cost-effectiveness of TBAs and CHWs in resuscitation. Individual effectiveness may be demonstrable but the question also relates to the number of deliveries per year and cost of inputs in order to compare cost-effectiveness.
SUNDAY AFTERNOON

Small Group Session 2: Group A
Operationalization of programmatic components to manage the baby who does not breathe at birth

Group members
- Stella Abwao
- Nabeela Ali
- Abhay Bang
- Kent Bream
- Gary Darmstadt
- Ornella Lincetto
- Judith Moore
- Rajesh Kumar
- Dharmapuri Vidyasagar
- David Woods

Task

Taking the consensus we have reached on how to manage the baby who is not breathing at birth, how should this be operationalized?

South Africa has adopted a slogan, “Every baby has the right to breathe”. This has been very positive in national advocacy. Before implementing the “who and how”, there are needs for a process to gather key stakeholders and provide a policy framework. This may be carried out internally such as through the National Neonatology Forum of India, or may be supported from outside, such as Nepal’s national neonatal plan being drafted at present. Prevention and management of asphyxia will fall within Safe Motherhood, Essential newborn care/resuscitation and care of the ill newborn.

Expected steps might include the following:
- Assess the magnitude of the problem
- Sensitization of stakeholders and team building (possible workshop/meetings)
- Assessment of current programs and capacity
- Prioritization of strategies and program planning
  - Training/Capacity building
  - Logistics such as equipment
- Monitoring and evaluation plans

1. Who does what?
- Everyone in direct contact with the newborn immediately after delivery should be given training in basic principles (dry, keep warm, skin-to-skin care)
- All skilled attendants must be trained to resuscitate effectively
- Continuing debate over how many people at delivery. While the ideal may be to have a second person at delivery, the reality is that we fail to have a skilled attendant at half the world’s deliveries, and it may be better to aim for one for everyone.
- The debate as to training of community-level personnel in resuscitation hangs more on cost-effectiveness and sustainability than on whether it is possible to teach such skills at this level. If a
TBA does 20 deliveries a year (above the norm) they will need to resuscitate about once a year and this is unlikely to be viable for training and equipment input as well as to maintain competency.

- Core skills were deemed to be:
  - Immediate assessment and resuscitation if required
  - Immediate care (dry and warm, reassess)
  - Initiate and support breastfeeding
  - Infection control

2. **What are the training and supervision inputs?**
   - Start now to address policy guidelines, local adaptations of protocols to various levels of care, and various skills of health care cadres
   - Begin with in-service training
   - Concurrently move to change pre-service training to include essential newborn care with resuscitation as a component of this, although it will take several years before benefit is seen
   - Emphasize need for ongoing re-training/continuous training as skills decay quickly
   - Audit is an important tool for supervision and continuous improvement of the system

3. **What is necessary in terms of environment and equipment?**
   - Soap to wash the hands of the attendant before delivery
   - Clean cloth for drying the baby (ideally warmed)
   - Another cloth to wrap the baby in
   - Self-inflating bag and mask
   - A suction device
   - Watch/clock
   - Warmth and light

4. **What are the key process and outcome indicators?**
   
   The need for indicators regarding quality of resuscitation, failed resuscitation rate and ideally disability rate were stressed. Simply counting babies who are resuscitated may miss situations were poor quality resuscitation may do more harm than good.

5. **What are the priorities for research?**
   
   See full list on Page 32.

**Small Group Session 2. Group B**

**Initial draft of advocacy statement and target audiences**

**Group members**

- Zulfiqar Bhutta
- Elizabeth Bocaletti,
- Joseph de Graft-Johnson
- Matthew Ellis
- Joy Lawn
- Jelka Zupan
Tasks

1. **To draft an initial advocacy statement of the rest of the panel to review.**

   The draft is included in Annex 2

2. **To consider target audience, purposes for this statement and the broader context of how to advocate for more attention/action regarding “birth asphyxia”**

   Potential uses for the asphyxia advocacy piece:
   - Release after new GBD estimates published during 2003
   - Channel through Healthy Newborn Partnership?
   - Target Millennium Development Goals processes
   - Aim for launch of Partnership of Safe Motherhood and Newborn Health in late 2003
   - Use in SNL national programs (suggestion Dr. Elizabeth Bocaletti)
   - Others suggestions?
MONDAY MORNING

Summary of four setting model to aid decision-making in addressing birth asphyxia
[Dr. Joy Lawn]

Although at this meeting this model is applied specifically to addressing birth asphyxia, in reality the model and the process is more integrated. In a given setting there may be an excess of deaths due to neonatal tetanus and this may be deemed the first priority to address. There is no one size fits all neonatal program and prioritization will depend on the local problems, current programs and capacity, the concerns of the community, the cost of interventions and feasibility/sustainability.

Figure 3 shows the 14 subregions used by the GBD project (sub-divisions of the United Nations regions) stratified by NMR to give a four-setting approach. The depiction of skilled attendant coverage by setting is not implying a causal relationship, but is simply a marker of availability of skilled care and a functioning health system. However, it is notable that in Setting D where over 75% of neonatal deaths occur, the average coverage with skilled attendance is around 35%. Hence the majority of neonatal deaths occur in places where skilled care is not currently the norm.

Figure 3. Four settings for newborn health

(Draft report, Birth asphyxia: to breathe or not to breathe. Lawn J, Darmstadt G, Nov 2002)
Note: The settings are delineated by NMR level. The depiction of skilled attendant coverage by setting is not implying a causal relationship, but is simply a marker of availability of skilled care and a functioning health system.
The settings were used for estimation of the GBD, but in applying this to decision-making, Setting D may need to be further sub-divided. The principle is that within any given country, there may be subpopulations with an NMR relevant to Setting A (e.g., the middle class in Delhi), and other subpopulations falling into setting D (e.g., rural Orissa). Different priorities will apply to different groups.

Discussion among the panel suggested that the decision-making setting model should remove the subregions such that the model is based only on mortality strata. It was felt that it may be confusing for a decision-maker who may place their setting by their geographical location (e.g. India in SEARO D) rather than pegging their subpopulation by NMR strata.

Concern was expressed by some members regarding possible over-interpretation of use of the “variable, skilled attendant at delivery,” potentially perpetuating ecological fallacy with national/sub-regional associations being taken as causal. Options to address this were discussed, including removal of skilled attendance coverage altogether, or changes in titles, and notes on the graph to make this issue as clear as possible.

In each setting, the predominant place of delivery, person at delivery, and person supplying newborn care varies. This is described in more detail in the draft background report for the meeting. Add-on strategies both extending the health care system and building up from the community could be considered, depending on the local problems and capacity. While there are a few studies and very limited cost data to guide decision-makers, several in the panel expressed the view that there was very little policy discussion regarding options, partly because of the priority need to focus on increasing coverage with skilled attendance. While all agreed that this was a priority, there is a danger that not even allowing discussion of interim strategies for under-served women will increase the already wide gap for delivery care across the socio-economic strata. In the words of a Cameroonian saying, “When the elephant and the rhino fight, it is the grass that suffers.”

**The role of the TBA**

[Professor Rajesh Kumar]

Potential roles for the TBA include behavior change communication, service provision and health system support/partnership. The Department of Community Medicine, Chandigarh, has 22 years of experience in TBA training and a number of evaluation studies. There is a population of 100,000 in 150 villages with a trained TBA per village.

1. Behavior change communication (No formal evaluation of impact)
   - Promotion of care-seeking from Skilled Attendants/Health Facility, providing information to families and women about availability of care
   - Communicate Danger Signals: Provide information on Health Facilities where these problems can be managed, including requirement of funds, transport, etc.
   - Promote more dietary intake, reduced physical labor, iron tablets, TT immunization

2. Service provision

---

• Antenatally identify pregnancy and its complications (danger signals) and facilitate care-seeking from health facility. Supply iron supplements and assist delivery of TT by health workers
• Attend delivery if woman chooses to deliver at home and ensure hygiene by using delivery kit. To identify complications during delivery and ENSURE early transfer to health facility, accompany the woman to health facility if needed
• Essential newborn care
  • Wipe, dry, assess
  • Resuscitate, if needed, use bag and mask if available
  • Warmth
  • Feeding
    o Promote early and exclusive breast feeding
    o Promote early care-seeking for illness in baby and use of immunization services
• Provide information on births (fresh stillbirths) and deaths (first day and later) to the vital events system

Table 3. Evaluation of TBAs trained to provide neonatal resuscitation (Kumar R 1999)

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Trained TBAS</th>
<th>Advanced trained TBAs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Incidence of not breathing at birth (%)</td>
<td>2.4</td>
<td>0.9</td>
</tr>
<tr>
<td>Case fatality rate (%)</td>
<td>78%</td>
<td>62%</td>
</tr>
<tr>
<td>Asphyxia-related mortality (per 1000)</td>
<td>1.9</td>
<td>0.6</td>
</tr>
<tr>
<td>Perinatal mortality rate (per 1000)</td>
<td>6.1</td>
<td>4.9</td>
</tr>
</tbody>
</table>

3. Health System Support
• Facilitate health service delivery in village (link between community and health worker)
• Provide needed supplies, delivery kits, record books, bag and mask, etc.
• Provide opportunities for Continuing Training (Every month for a day) after an initial competency-based training (training and practice and training)
• Provide opportunity for TBA to accompany the women as companion if requested by woman

Within the site, there is increasing coverage with community midwives at village level. While 65% of women in the area express a preference for a skilled attendant, of those who have already delivered with skilled care, 85% would prefer skilled care. This suggests the need for a shift in the role of a TBA to a more supportive and partnership approach, involved in behavior change and facilitating referral when required. The adjusted PMR for those delivering with a skilled attendant is 39 per 1000 compared to 87 per 1000 for the non-advanced trained TBAs.

Community-based interventions to address birth asphyxia with TBAs and CHWs
[Dr. Abhay Bang]

SEARCH has had 14 years of experience in home-based neonatal care, as summarized in Table 4. The following case definitions of birth asphyxia based on the National Neonatology Forum of India are used in SEARCH data collection:12

Mild: at 1 minute after birth no cry, breath was absent, slow, weak or gasping
Severe: at 5 minutes after birth the breath was absent, slow or gasping

Table 4. The SEARCH experience in home-based neonatal care

<table>
<thead>
<tr>
<th>Years</th>
<th>Approach</th>
<th>Reduction of NMR</th>
<th>Ref</th>
</tr>
</thead>
<tbody>
<tr>
<td>1995-1998</td>
<td>(baseline)</td>
<td>57% compared to control (59.6)</td>
<td>(48% reduction in asphyxia–related deaths (N=13))</td>
</tr>
<tr>
<td>1999 to date</td>
<td>On-going home-based neonatal care</td>
<td>-</td>
<td>Not yet published</td>
</tr>
<tr>
<td>ANKUR project</td>
<td>Home-based neonatal care in 7 NGO areas</td>
<td>-</td>
<td>Ongoing</td>
</tr>
</tbody>
</table>

Dr. Bang presented results specific to the effect on birth asphyxia as summarized in Table 5. Over a 6 year period there has been a significant decrease in the incidence of “mild asphyxia” with a relatively constant case fatality rate (CFR). The incidence of “severe asphyxia” has remained apparently unchanged although the CFR fell from 38.5% to 25.8%, which was statistically non-significant possibly due to small numbers. The asphyxia- specific NMR fell from 10.5 to 2.4 per 1,000, which was statistically significant, although this includes a mixture of “mild” and “severe” asphyxia. Dr. Bang emphasized that the resuscitators much preferred to use the bag and mask rather than the tube and mask device. While the bag and mask has been considerably more expensive, it is now available in India for $6.00.

Table 5. Changes in “mild” and “severe” asphyxia with time in SEARCH

<table>
<thead>
<tr>
<th>Years</th>
<th>Mild asphyxia % incidence (CFR %)</th>
<th>Severe asphyxia % incidence (CFR %)</th>
<th>Asphyxia-specific mortality rate per 1000 live births</th>
</tr>
</thead>
<tbody>
<tr>
<td>1995 – 1996</td>
<td>14.2 (3.7)</td>
<td>4.6 (38.5)</td>
<td>10.5</td>
</tr>
<tr>
<td>TBAs using tube and mask resus</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1997-1998</td>
<td>7.9 (1.6)</td>
<td>2.5 (31.6)</td>
<td>5.5</td>
</tr>
<tr>
<td>TBAs + VHW drying and using tube and mask resus</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2000-2001</td>
<td>5.2 # (3.0)</td>
<td>4.9 (25.8)</td>
<td>2.4 *</td>
</tr>
<tr>
<td>TBAs + VHW drying and using bag and mask resus</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

# change in incidence highly significant (p < 0.001), but no significant change in CFR
* significant at p < 0.04

Discussion: Much discussion focused on the case definitions for asphyxia. It was felt by many that the definition of mild asphyxia is too common (14.2 % of all deliveries), may well be a self limited condition, and is probably a mixture of conditions such as early sepsis, preterm birth, as well as intrapartum hypoxia. The fact that the CFR had not changed may reflect the fact that these babies would recover whether they were resuscitated or not. The severe asphyxia category is a more robust measure of the problem and the CFR has decreased, although not significantly.
Discussion of roles for TBAs/CHWs

A brief discussion regarding roles for TBAs and CHWs concluded that:

• There is consensus that skilled care for all women should be a right and that all skilled attendants should be trained to competency in neonatal resuscitation.

• There is agreement that there is a large group of women who currently do not have skilled care. Some members felt that this problem may be addressed in a decade or less, but others felt strongly that it will take longer, not only to train sufficient numbers of skilled attendants but also to build a system to support them at community level.

• The poorest and most isolated women are likely to be left without skilled care for the longest time unless interim solutions are applied. Solutions include both extending care from the formal health system (such as maternity waiting homes) and building up from the community using TBAs and CHWs, where these are currently the norm, and they have sufficient skills and case load to be cost-effective, and links to the health system are used.

• As roles for TBAs and CHWs were not agreed upon, given the lack of evidence and the differing viewpoints of the panel, it was decided that evaluation of feasible roles should become a research priority. Possible suggested roles included behavior change communication, particularly around birth preparedness, facilitating referral, and postnatal home visiting.

Conclusion of the meeting

In conclusion, the panel agreed that asphyxia-related neonatal deaths and disability, as well as the closely associated burden of intrapartum stillbirths, are an important and often neglected problem. Addressing these deaths is crucial in addressing newborn survival and meeting Millennium Development goals for child survival, and the priority is the poorer settings of South Asia and sub-Saharan Africa. The keys to prevention lie within Safe Motherhood programs, with greater coverage of skilled attendants and better access to emergency obstetric care. Neonatal resuscitation skills and basic equipment must be promoted as a norm for the skilled attendant. However, while working towards skilled attendance for all, interim add-on approaches including use of community level workers where locally appropriate are required to improve outcomes for the world’s poorest women and newborns. Despite differing views on short term strategies, there was agreement of the need to raise more awareness at all levels of policy and to test approaches to extend skilled obstetric and early postpartum care into the most under-served communities, benefiting women and infants.

The meeting ended with thanks expressed to the panel members for their inputs, to David Woods and the team at University of Cape Town for smooth arrangements as well as to all at SNL Washington for support and input as well as sponsoring the meeting. The panel also thanked Joy Lawn for her efforts in preparing the draft report. The various outputs were discussed and listed as follows:

1. Program advice to SNL regarding birth asphyxia
2. Algorithm for the identification and management of the baby who does not breathe at birth
3. Asphyxia advocacy piece
4. Research priorities (request for applications for new research funded by SNL will be released)
5. Meeting report
6. Various publications planned (GBD estimates, review of add-on strategies, decision-making framework survey, etc.)
Summary of outputs of the meeting

1. Program advice to SNL regarding birth asphyxia
   Answers to the question “What can SNL specifically add in programming or demonstration projects to the reduction of the burden of intrapartum hypoxia?”
   Uses: internal to SNL

   Agreement:
   • Essential newborn care is a major focus for SNL. Within this, SNL can contribute significantly to the reduction of asphyxia-related mortality by promoting the norm that essential newborn care as practiced by skilled attendants should always include neonatal resuscitation (note that no consensus could be reached on training “non-professionals” in neonatal resuscitation, so this becomes an important research topic)
   • SNL could make a major contribution to the reduction of asphyxia-related neonatal mortality by supporting national level approaches to strengthen neonatal resuscitation, in terms of advocacy, policy, inputs to training (pre-service and in-service) and to support systems.
   • SNL could make an important contribution to improving the current confusion regarding case definitions and to improving the severe lack of data by developing and validating program indicators to assess incidence of intrapartum stillbirths, asphyxia-related neonatal mortality, impact and process of interventions.

2. Algorithm for the identification and management of the baby who does not breathe at birth
   This is outlined on page 14 of this meeting report.

3. Advocacy piece
   Plan: Comments to Joy (joylawn@yahoo.co.uk) for redrafting (see annex for draft)
   Possible uses:
   • Channel through Healthy Newborn Partnership
   • Release after publication of GBD figures
   • Aim for launch of Partnership for Safe Motherhood and Newborn Health?
   • SNL program managers/regional advisors in national advocacy
   • Other suggestions??

4. Research priorities
   Priority Number 1: Simple add-on assessments in programs such as indicator validation, evaluation of essential newborn care manual resuscitation component, documenting process of resuscitation training and costs.
   Actions:
   • David Woods is starting on this using data from Perinatal Problem Identification Programme (PPIP) data in the Cape Town area.\textsuperscript{13}
   • An improved neonatal verbal autopsy instrument is under development, led by Gary Darmstadt.
   • Perinatal audit was considered to be a useful strategy, as yet unproven at community level, and with no known cost data. It was suggested that La Rue Seims, the SNL M&E expert and also leader of the Healthy Newborn Partnership Perinatal Death Audit Working Group may be open to collaborative work to look at the role of audit in addressing avoidable deaths related to intrapartum hypoxia.

\textsuperscript{13} Note that the initial work on this was presented at the South African Perinatal Priorities meeting in March 2003
Priority number 2: Appropriate feasible roles for TBAs/CHWs around time of delivery such as birth preparedness, referral. Emphasis from panel was to start with feasible tasks, and to evaluate in several different cultural settings while promoting support and referral system (e.g., mobile phones). A crucial question is entry requirements such as number of deliveries per year. Then if skills and impact are shown, consider moving to additional tasks such as resuscitation.

Actions:

- Basis of funding of Request for Applications by SNL mid/late 2003. 14

Other research needs such as better defining the GBD are ongoing as part of the SNL asphyxia assessment. There was a long list of other research questions, which, while important, are not SNL priorities. These included some simple questions re clinical case management of the “non-breathing baby” (such as timing of initiation of resuscitation, role of suctioning). The question of the interaction of maternal infection and a clinical presentation of not breathing at birth and/or neonatal encephalopathy is important, especially in setting with high rates of maternal infections. Some questions were raised (e.g., air versus oxygen for resuscitation) that will require large, multi-center trials to provide final answers.

5. Meeting report

Plan: Joy to prepare and circulate draft.
Uses: internal to SNL and panel, with pdf sent out by email, and put on the web

6. Draft background report and linked publications

Plan: Redrafting will be the responsibility of Joy with input from Gary and comments are welcome.
Uses:
- GBD assessment for WHO to be published when cleared by WHO
- A series of publications
  - Full GBD methods/estimates should probably be the first
  - Early on: editorials/sounding board pieces in BMJ/NEJM with different focus
  - Survey
  - Reviews of evidence
  - Later: model/planning tool
- Advocacy and program pieces
- Complete report to be available as a PDF once the other products are out.

14 Note that this RFA was circulated and 38 proposals received for review
Annexes
**ANNEX 1. PARTICIPANTS**

<table>
<thead>
<tr>
<th>Name</th>
<th>Contact Information</th>
</tr>
</thead>
</table>
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ANNEX 2. ASPHYXIA ADVOCACY PIECE

Draft Advocacy Statement
Birth asphyxia: a new cry

Globally XX\(^{\text{15}}\) babies die each year, either dying in the womb during labor (intrapartum stillbirths) or in the first days of life due to complications of late pregnancy and delivery. A further estimated XX\(^{\ast}\) have long-term severe disability, and a significant but unmeasured number have learning difficulties. Reduction of this burden is essential to achieving Millennium Development Goals for improving child survival. Birth asphyxia is a major cause of deaths in the first week of life, when over two-thirds of neonatal deaths and about 40\% of infant deaths occur.

The majority of these deaths can be prevented by skilled care during pregnancy and childbirth, and by basic resuscitation of the baby who does not breathe at birth. Investment in the provision of skilled care during birth and immediately after birth is repaid two-fold as this is fundamental to reducing maternal mortality and morbidity as well as stillbirths and early neonatal deaths. Effectiveness requires a functional healthcare system with suitably trained and equipped staff. Currently, around half of the world’s women and newborns do not have access to skilled care at the time of delivery.

We must redouble international, national and local efforts to increase the numbers of birth attendants with resuscitation skills, while ensuring a functioning referral and support system, particularly for underserved, poor populations where most maternal and newborn deaths occur.

An estimated 4 to 8 million babies require resuscitation at birth each year. All women in labour should be assisted by a person skilled in basic resuscitation and with access to the right equipment to resuscitate those newborns that do not breathe spontaneously. This will require competency-based training for all skilled attendants (in-service or pre-service), applying agreed guidelines, and simple, functional equipment including bag and mask and suction apparatus. Highly technical equipment or even oxygen is not required to save most of these lives. Tools such as the partogram (a simple graphical record of the progress of labour) to are effective in preventing maternal, fetal and neonatal deaths. What is required is sustained investment to train, equip, and support staff at health facilities, and to develop innovative approaches extending such services to underserved communities where most newborn, and also maternal, deaths occur.

Possible uses:

- Channel through Healthy Newborn Partnership
- Release after publication of GBD figures
- Aim for launch of Partnership for Safe Motherhood and Newborn Health?
- SNL program managers/regional advisors in national advocacy
- Other suggestions welcome

Comments/suggestion to Joy Lawn at joylawn@yahoo.co.uk

\(^{15}\) Number will be added when finalized with WHO
# ANNEX 3. MEETING SCHEDULE

<table>
<thead>
<tr>
<th>Day</th>
<th>Activity</th>
</tr>
</thead>
</table>
| Friday 29th November | **Welcome**  
|                   | - Welcome [David Woods and Joy Lawn]  
|                   | - Introductions  
|                   | - Overview of meeting objectives [Joy Lawn]  
|                   | - Informal discussions over evening meal  
|                   | 6:00 meeting room  
|                   | 7:30 Dinner at Cape Milner  
| Saturday 30th November | **Global burden of disease** (Report Part One)  
|                   | - Chair person: David Woods  
|                   | - Previous estimates of Global Burden of “Birth Asphyxia” [Joy]  
|                   | - What is birth asphyxia, case definitions [Joy]  
|                   | - Variation of the incidence of Neonatal Encephalopathy, CFRs and disability based on Nepal studies [Matthew Ellis]  
|                   | - Discussion  
|                   | 8:30 am – 9:00  
|                   | 9:00 – 9:30  
|                   | 9:30 – 9:50  
|                   | 9:50 – 10:00  
|                   | 10:00 – 10:30 Coffee break  
|                   | 10:30 – 11:00  
|                   | - Report of WHO GBD efforts regarding the neonate [Jelka Zupan]  
|                   | - Discussion  
|                   | - Overview of methods for estimation of GBD for asphyxia [Joy Lawn]  
|                   | 1:00 – 2:00 Lunch  
|                   | 2:00 pm – 3:30  
|                   | - The baby who does not breathe at birth  
|                   | - Chair person: Zulfiqar Bhutta  
|                   | - Recognition  
|                   | - Clinical management  
|                   | - Development of simple algorithm  
|                   | 3:30 – 4:00 Tea break  
|                   | 4:00 – 5:30  
|                   | - Evidence for interventions (Report Part Two)  
|                   | - Chair person: Kent Bream  
|                   | - Review of interventions in draft report [Joy]  
|                   | - Discussion as 5-10 discussion after each section  
|                   | 7:30 Dinner at Emily's in the V&A Waterfront  
|                   | (transport arranged from and to Cape Milner)  

<table>
<thead>
<tr>
<th>Day</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sunday 1&lt;sup&gt;st&lt;/sup&gt; December</td>
<td><strong>Program implementation experience/perceptions</strong></td>
</tr>
<tr>
<td></td>
<td>Chair person: Elizabeth Bocaletti</td>
</tr>
<tr>
<td>8:30 am – 9:15</td>
<td>✎ Major findings from the survey [Gary]</td>
</tr>
<tr>
<td>9:15 – 9:45</td>
<td>✎ Lessons learned from South African experience in addressing avoidable causes of death and in distance learning to improve practices [David Woods]</td>
</tr>
<tr>
<td>9:45 – 10:15</td>
<td>✎ Discussion</td>
</tr>
<tr>
<td>10:00 – 10:15</td>
<td>Coffee break</td>
</tr>
<tr>
<td></td>
<td><strong>Program implementation</strong></td>
</tr>
<tr>
<td></td>
<td>Chair person: Nabeela Ali</td>
</tr>
<tr>
<td>10:15 – 10:45</td>
<td>✎ Discussion of program implementation,</td>
</tr>
<tr>
<td>10:45 – 11:45</td>
<td>✎ Small group session 1</td>
</tr>
<tr>
<td></td>
<td>Group A: Health facility</td>
</tr>
<tr>
<td></td>
<td>Group B: Community</td>
</tr>
<tr>
<td>11:45 – 12:15</td>
<td>✎ Feedback from small groups - 15 min each group</td>
</tr>
<tr>
<td>12:15 – 1:00</td>
<td>✎ Summary for program implementation</td>
</tr>
<tr>
<td>1:00 – 2:00</td>
<td>Lunch</td>
</tr>
<tr>
<td></td>
<td><strong>Research priorities</strong></td>
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<tr>
<td></td>
<td>Chair person: Dr. Dharmapuri Vidyasagar</td>
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<tr>
<td>2:00 pm – 2:15</td>
<td>✎ Discussion of objectives for small groups</td>
</tr>
<tr>
<td>2:15 – 3:45</td>
<td>✎ Small session 2</td>
</tr>
<tr>
<td></td>
<td>Group A: Operationalization of algorithm for baby who does not breathe at birth</td>
</tr>
<tr>
<td></td>
<td>Group B: Draft of advocacy document</td>
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<tr>
<td>3:45 – 4:00</td>
<td>Tea break</td>
</tr>
<tr>
<td>4:00 – 4:30</td>
<td></td>
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<tr>
<td>4:45 – 5:30</td>
<td></td>
</tr>
<tr>
<td>7:30</td>
<td>Evenining Dinner at the Cape Milner or Free time</td>
</tr>
<tr>
<td>Day</td>
<td>Activity</td>
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<tr>
<td>----------------------------</td>
<td>--------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Monday 2nd December</td>
<td><strong>Roles for TBAs and CHWs related to “asphyxia”</strong></td>
</tr>
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<td>Chair person: Joseph de Graaff-Johnson</td>
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<tr>
<td>8:30 am – 9:30</td>
<td>✒️ Summary of asphyxia-related outcomes by a four setting model and health care services by setting [Joy]</td>
</tr>
<tr>
<td>9:30 – 10:00</td>
<td>✒️ The role of the TBA [Rajesh Kumar]</td>
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<tr>
<td>10:00 – 10:30</td>
<td>✒️ Community-based interventions to address birth asphyxia with TBAs and CHWs [Abhay Bang]</td>
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<tr>
<td>10:30 – 11:00</td>
<td>✒️ Discussion of recommendations regarding TBAs/CHWs</td>
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<td>Coffee break</td>
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<tr>
<td>11:00 – 13:00</td>
<td><strong>Conclusion, overall consensus and actions</strong></td>
</tr>
<tr>
<td></td>
<td>Chair person: Judith Moore</td>
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<td>✒️ Discussion of plans for dissemination of consensus document and general promotion of attention and funding for “birth asphyxia”</td>
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<td>✒️ Advocacy statement</td>
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<tr>
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<td>✒️ Conclusion of meeting and “thank you”</td>
</tr>
<tr>
<td>1:00 – 2:00</td>
<td>Lunch</td>
</tr>
<tr>
<td>Afternoon (optional but all welcome)</td>
<td><strong>Visit to the Obstetric/Neonatal care program in Cape Town</strong></td>
</tr>
<tr>
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<td>The continuous audit of preventable fetal and neonatal deaths at all levels in this system is addressing birth asphyxia as the major cause of stillbirths and neonatal deaths in term babies.</td>
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<tr>
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<td>✒️ Possibility of sharing dinner with South African colleagues</td>
</tr>
<tr>
<td></td>
<td>* Division of Neonatal Medicine, School of Child and Adolescent Health, University of Cape Town, comprising of 3 hospitals and 6 midwife obstetric units, covering 30,000 deliveries per year and linked to a perinatal surveillance covering a significant proportion of perinatal deaths in South Africa.</td>
</tr>
</tbody>
</table>
ANNEX 4. GLOSSARY

- **Apgar score**: Virginia Apgar, an American anesthesiologist described this score in 1953, providing a standard record of the condition of the infant at birth, including breathing, heart rate, color, muscle tone and response to insertion of a suction catheter. Each of these 5 characteristics may be assigned a score between 0 and 2, giving a maximum of 10. The score recorded is a total for the baby’s condition at 1 minute and at 5 minutes. It should be noted that the intention was to guide clinical decision-making not to predict outcome.

- **“Birth asphyxia”**: A baby that fails to initiate or maintain regular breathing at birth. This does not imply a particular causation (e.g., intrapartum) or a particular outcome. Neonatal encephalopathy is a more precise marker of outcome.

- **Birth preparedness/emergency preparedness**: The process of promoting behaviors and preparation in the home, community and health system to ensure that delays in access to quality care are minimized for women and newborns with complications.

- **Add-on strategy**: An interim intervention strategy to bridge the gap in care for mothers and newborn in settings with low coverage of skilled attendance.

- **Cerebral palsy**: A non-progressive disorder of motor function, which may originate during pregnancy, delivery or in the post-natal period.

- **Community level**: Within the home or peripheral basic healthcare facility, but not in hospital.

- **Community health worker (or village health worker)**: An unskilled worker at the community level who has received basic training in aspects of preventive and simple curative care. This individual is often a volunteer or receives nominal compensation.

- **Disability**: Any restriction or lack (resulting from an impairment) of ability to perform an activity in the manner or within the range considered normal for a human being (International Classification of Functioning, Disability and Health).

- **Fetal death**: A baby born with no signs of life after 22 weeks gestation (equivalent to 500 grams). Late fetal death is a baby born dead after 28 weeks of gestation (equivalent to 1000 grams) [ICD 10]

- **Four setting model for newborn health**: This is a simple model with four settings delineated by mortality level (NMR) and health care available (skilled attendance at delivery), with Setting D having the highest NMR (> 40 per 1000 births) and lowest skilled attendance (< 40%). Each setting also differs in the health care information available, and hence methods for estimation of the global burden of disease differ by setting. Priorities to address healthcare problems, including “birth asphyxia” also differ by setting.

- **Fresh stillbirth**: A stillborn baby (shows no signs of life at delivery and weighs more than 500 grams or is greater than 22 weeks gestation) with intact skin and no signs of disintegration. The death is assumed to have occurred in the 12 hours before delivery and is most likely to be due to asphyxia. In the Wigglesworth classification babies with severe congenital abnormalities or severe prematurity (less than 32 weeks) are not included.

- **Handicap**: A disadvantage for a given individual, resulting form an impairment or disability that limits or prevents the fulfillment of a role that is normal (depending on age, sex and social and cultural factors for that individual [ICID-2, WHO 1999])

- **Hypoxic Ischaemic Encephalopathy (HIE)**: A syndrome of abnormal neurological behavior in the neonate, which is frequently associated with multi-system dysfunction and follows severe hypoxia before or during delivery. There are several systems for categorizing HIE (most commonly into mild, moderate, severe). Most authorities now prefer the term Neonatal Encephalopathy and then specifying if the encephalopathy is due to hypoxia.
• **Impairment:** Any loss or abnormality of psychological, physiological or anatomical structure or function [ICID-2, WHO 1999]

• **Intrapartum hypoxia:** A severe lack of oxygen to the fetus during the time of labor, often associated with an acute obstetric event such as hemorrhage or obstructed labor.

• **Intrapartum hypoxia-related outcomes:** The outcomes of interest include intrapartum stillbirth, neonatal encephalopathy, neonatal death and severe impairment.

• **Low Birth Weight:** A baby weighing less than 2500 grams at birth (or up to 48 hours after birth).

• **Macerated stillbirth:** A stillborn baby (shows no signs of life at delivery and weighs more than 500 grams or is greater than 22 weeks gestation) with broken skin and signs of disintegration. The death is assumed to have occurred more than 12 hours before delivery and there are many possible causes including infections, congenital abnormalities or severe hypoxia more than 12 hours before delivery e.g. prolonged obstructed labor due to transport difficulties. In the Wigglesworth classification babies with severe congenital abnormalities or severe prematurity (less than 32 weeks) are not included.

• **Neonatal death:** The death of a baby during the first 28 completed days after delivery.

• **Neonatal encephalopathy:** “a disturbance of neurological function in the earliest days of life in the term infant manifested by difficulty initiating and maintaining respiration, depression of tone and reflexes, abnormal level of consciousness and often by seizures”, which may follow an intrapartum hypoxic insult or be due to another cause.\(^\text{16}\) Neonatal encephalopathy is usually separated into 3 grades (mild, moderate, severe) by clinical findings during the first week of life. Virtually all babies with mild NE who are normal at the end of the first week of life will be free of long-term neurological damage. The majority of infants with severe NE will die or manifest severe neurological impairment.

• **Preterm birth:** Birth before 37 completed weeks of gestation (259 days). Gestational age may be assessed by Last Menstrual Period (LMP), ultrasound examination during pregnancy or clinical examination of the newborn after delivery for which there are a number of scoring systems (Dubowitz, Parkin etc).

• **Saving Newborn Lives:** An initiative of Save the Children US which is funded by the Gates Foundation.

• **Skilled attendant at delivery:** Individuals with “midwifery skills (i.e., doctors, midwives or nurses) who have been trained to proficiency in the skills to manage normal deliveries, diagnose and manage or refer complicated cases”.\(^\text{17}\)

• **Stillbirth:** This may refer to any fetal death (from 22 weeks of gestation or 500 grams). As international comparison is based on late fetal deaths in these document stillbirths will be taken as equivalent to late fetal death, which is a baby who is born with no signs of life after 28 weeks of gestation (equivalent to 1000 grams).

• **Traditional Birth Attendant (as distinct from skilled attendants)** is a local individual, usually a woman who attends deliveries and provides other maternity-related services without formal training. A trained TBA is a TBA who has received some formal training in clean, safe delivery care.

• **Untrained traditional health care providers** include those who have not received any training within the formal health care delivery system, for example shamans.

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\(^{16}\) Birth asphyxia a statement. Dev Med Child Neurol 1993; 35: 1022-1024

\(^{17}\) MotherCare Policy brief No 3, 2000.