

**STATE OF  
THE WORLD'S  
NEWBORNS**

A Report from Saving Newborn Lives





**WOMEN & CHILDREN FIRST**  
**WCF**  
20 Balliford Street  
London WC1E 2HS UK  
Tel: +44(0)20 7462 1212  
Fax: +44(0)20 7462 1213  
Web: <http://wcf-uk.org>  
E-mail: [info@wcf-uk.org](mailto:info@wcf-uk.org)

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"We know what needs to be done.

We have the tools. It is time to  
marshal global political will and  
to commit unprecedented  
resources to saving newborn  
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children a healthy start now."

**Melinda French Gates**

Co-founder, Bill &  
Melinda Gates Foundation



## FOREWORD

I believe every child should have the chance for a healthy start in life. Yet in many parts of the world, life-saving interventions are often not available.

Newborn mortality is one of the world's most neglected health problems. Worldwide, more than eight million babies each year are stillborn or die before they reach the age of one month.

Though these numbers are tragic, what's more devastating is the fact that we have the tools to address this situation yet fail to apply them. We can save many newborn lives through existing health care interventions that are both practical and affordable, even in communities that lack modern health care facilities.

At the heart of the problem is a stubborn and widening gap between the health of the world's rich and poor. Ninety-eight percent of these early deaths occur in developing countries. Simply put, most pregnant women and newborns living in impoverished circumstances do not, or cannot, get access to basic health

care services—either before, during, or after delivery.

The Bill & Melinda Gates Foundation is supporting Save the Children's Saving Newborn Lives initiative as part of a global initiative to improve the health and survival of newborns in the developing world.

To set the stage for this global effort, the Saving Newborn Lives initiative is issuing this first-ever report, *State of the World's Newborns*, to draw attention and pose solutions that will help save lives.

Drawing on the most recent data available from the World Health Organization, UNICEF, and other organizations, this report provides data on the situation of mothers and their newborns in 163 countries. It also outlines what can be done to address this critical, and largely neglected, health crisis.

Because the health of women and children go hand in hand, the report also shares personal stories of women from around the world about their experiences with childbirth and care of their newborns.

Over the next five years, Save the

Children will work with partners at the global and national level to improve health care policies and programs for mothers and newborns, with a special emphasis on those countries in greatest need. The Saving Newborn Lives initiative is designed to integrate essential newborn health care into existing maternal and infant care programs. Coupled with efforts to improve household and community practices, this strategy can make a lasting difference in the health of mothers and their newborns.

We know what needs to be done. We have the tools. It is time to marshal global political will and to commit unprecedented resources to saving newborn lives. We call on the world to give all children a healthy start now.

**Melinda French Gates**

Co-founder, Bill &  
Melinda Gates Foundation

## INTRODUCTION

On the eve of the United Nations General Assembly Special Session on Children, Save the Children is issuing the first-ever global report on the very youngest members of the global community: *State of the World's Newborns*. As international leaders sit down together to discuss the status of children, we at Save the Children believe that support must start at the very beginning. At birth, the odds for a healthy life are first set. What is the fate of the 350,000 babies born each day?

It is a tragic irony that in many countries, the odds are stacked against mothers and their babies just when both are at their most vulnerable and at greatest risk. Throughout the developing world, expectant mothers and their newborns run a gauntlet of health risks with little or no support or health care. Many of them do not survive the ordeal.

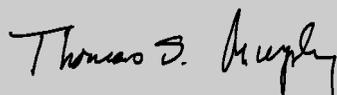
Save the Children initiated the Every Mother/Every Child campaign in 2001 to cast light on the lives of the millions of mothers and newborns worldwide who balance precariously on the brink between life and death. These are the 53 million women who give birth at home, without the help of professional birth attendants with delivery skills. Over four million newborns succumb to disease or complications of childbirth before they have seen a month of life and a similar number are stillborn. This situation reflects an unacceptable state of neglect in contemporary health care.

On Mothers' Day 2001, Save the Children released *State of the World's Mothers*, a country-by-country rating of the status of women and young

girls according to health, education, and socio-economic indicators. All the data point to the following conclusion: *When mothers survive and thrive, children survive and thrive*. And for mothers to thrive, they must have access to education; maternal and child health care, including family planning; and economic opportunities. Save the Children is committed to making this happen.

In the present report, *State of the World's Newborns*, we turn to the needs of newborns and the essential health care required for their future survival and well-being. Despite the daunting magnitude of newborn mortality each year, we *can* reverse this trend by initiating key health solutions that are proven, affordable, and doable. These include clean delivery practices, skilled care at birth, tetanus toxoid immunization, warmth and drying, and immediate and exclusive breastfeeding. Save the Children has developed a strategic program—Saving Newborn Lives—to help make that happen.

Thanks to the support of the Bill & Melinda Gates Foundation, the Saving Newborn Lives initiative is undertaking on-the-ground programs in Asia, Africa, and Latin America that will demonstrate how positive change is possible through judiciously supplied health measures. We count on the world's leaders to take stock of how mothers and newborns fare in every country. Investing in this most basic partnership of all—between mother and newborn—is the first and best step in ensuring healthy children, prosperous families, and strong communities.



**Thomas S. Murphy**  
Chairman, Board of Trustees  
Save the Children



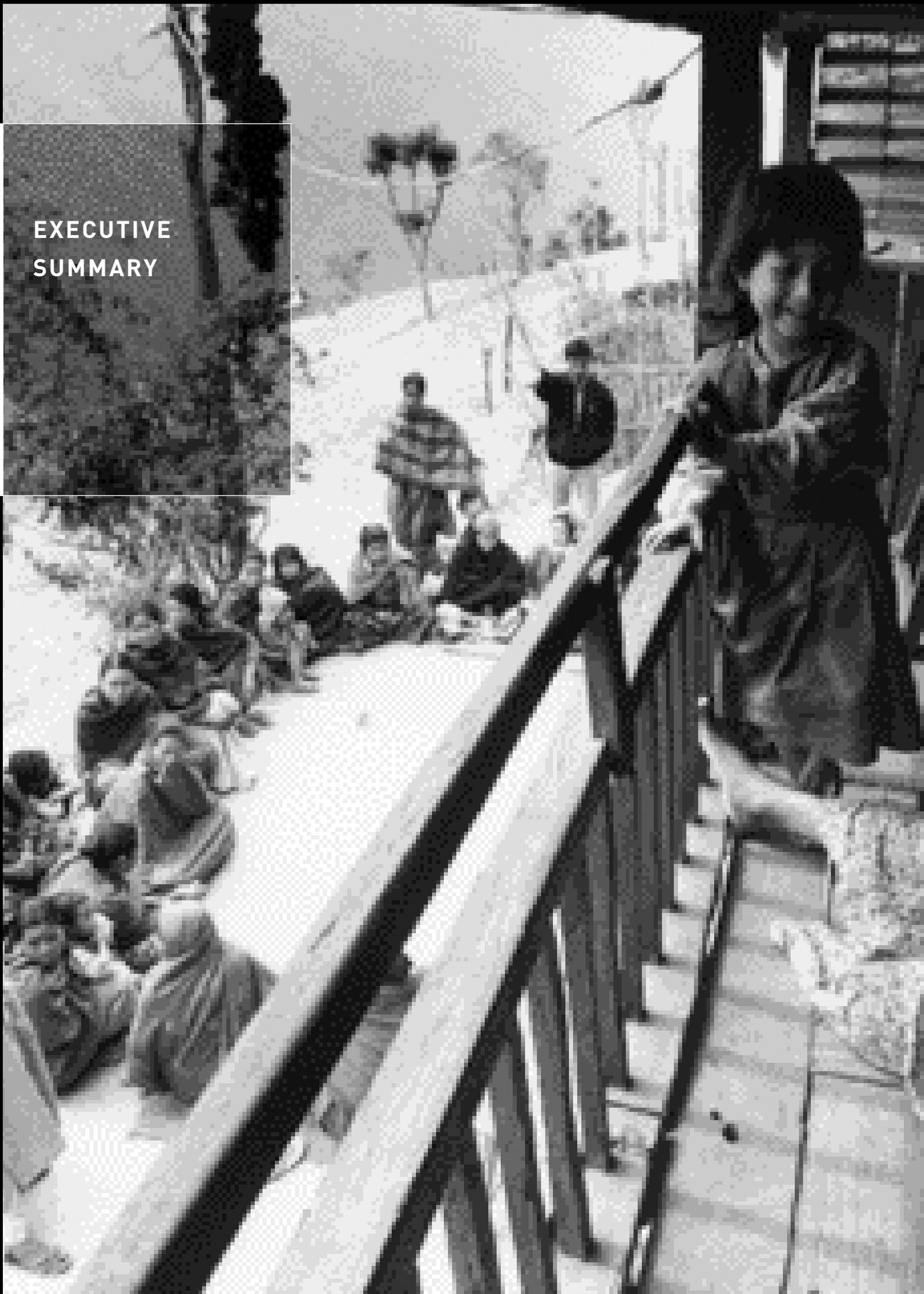
**Charles MacCormack**  
President, Save the Children



### EVERY MOTHER/EVERY CHILD CAMPAIGN MAKES NEWBORN AND MATERNAL HEALTH A PRIORITY

Nearly 70 years of field experience has taught Save the Children that to create real and lasting change in the quality of children's lives, we need to invest in their mothers. On Mothers' Day 2001, Save the Children launched a global public awareness and advocacy campaign—Every Mother/Every Child. Its goal is to ensure that mothers in developing countries have the tools they need to raise children who not only survive but thrive. These tools include maternal and child health care, family planning, education, and economic opportunities. Reducing newborn and maternal deaths are among the top priorities of the campaign. When communities take measures to ensure that mothers are healthy, well nourished, and well educated, their children are more likely to do well and to grow into strong, productive members of society.

EXECUTIVE  
SUMMARY





People in industrialized nations accustomed to specialized medical attention and hospital-based care find it hard to imagine that millions of babies die every year for the lack of such simple, low-cost expedients as regularly giving two doses of tetanus toxoid vaccine to a mother during pregnancy, arming a skilled birth attendant with a simple delivery kit (a plastic sheet, a bar of soap, string to tie the umbilical cord, and a razor to cut it), or encouraging a mother to exclusively breastfeed and keep her baby warm. Yet these are examples of measures we know can help save countless newborn lives in developing countries. The challenge now is to make these and other simple, affordable measures more widely available and used, while working to develop new and better community-based measures to treat certain newborn complications, such as infections and birth asphyxia.



### MAKING THE CASE

Each year, an estimated four million babies die before they reach the age of one month, and four million more are stillborn (dying between 22 weeks of pregnancy and birth).<sup>1</sup> Ninety-eight percent of these newborn deaths take place in developing countries, and, for the most part, these newborns die at home, in the absence of any skilled health care.<sup>2</sup> Enormous disparities exist between rich and poor countries. A mother in western Africa, for example, is 30 times as likely as a mother in Western Europe or North America to lose her newborn in the first month of life.

In the *State of the World's Newborns*, we review the most recent data on the newborn, revealing the alarmingly poor health and quality of health care for mothers and newborns in virtually all impoverished countries. While there has been a dramatic reduction in under-five mortality in the past two decades, there has been relatively little change in newborn mortality, even though proven, cost-

effective solutions exist to save many of these young lives. Indeed, newborn deaths now constitute over 40 percent of all deaths to children under age five. Until recently, policymakers and program planners focused relatively little attention on this age group, concentrating instead on interventions that primarily benefit infants over one month of age. We now recognize, however, that additional gains in child survival will depend in large measure on saving newborn lives.

### A SLENDER THREAD: THE VULNERABLE NEWBORN

According to the World Health Organization's estimates for 2001, infections account for 32 percent of newborn deaths (tetanus, sepsis, pneumonia, and diarrhea), complications of prematurity explain a further 24 percent, and birth asphyxia and injuries cause 29 percent.<sup>3</sup> An important secondary factor in 40 to 80 percent of neonatal deaths is low birth weight (a weight of less than 2,500 grams at birth).<sup>4</sup>

In addition to inadequate care of newborns, another major cause of neonatal deaths in developing countries is the poor health of mothers, especially during pregnancy, delivery, and the early postpartum period. Many pregnant women are inadequately nourished, overworked, and may still be recovering from a previous pregnancy. For many mothers, health care during this critical period is virtually nonexistent. It is estimated that last year 53 million women in developing countries gave birth with no professional health care whatsoever.<sup>5</sup>

### IMPROVING NEWBORN HEALTH

Most of these neonatal deaths can be prevented with cost-effective solutions that do not depend on highly technical training or sophisticated equipment. Proper nutrition and hygiene, for example, are the answer in many cases, while other deaths can be prevented by using widely available vaccines and medications to prevent and treat infections, by having skilled health care on hand during and after delivery, by recognizing and promptly treating obstetric complications, by keeping the baby warm and the umbilical cord clean, and by improving breastfeeding and family planning practices. By looking after the health of expectant mothers—before, during, and after delivery—many of the causes of newborn death can be prevented before they occur.

As noted above, there are several approaches to reducing newborn deaths that have been proven to be both feasible and cost-effective, including:

■ **Tetanus toxoid immunization:** Over 300,000 newborns die each year of neonatal tetanus—a highly preventable illness virtually unknown in the developed world. Two doses of tetanus toxoid, delivered as part of routine prenatal care for a little over

US\$1.00, can provide protection for both the mother and newborn.

■ **Skilled health care at delivery:** In many developing countries, most deliveries occur at home—and typically in the absence of an attendant trained in midwifery skills. The lack of knowledge and skills needed to help ensure a clean and safe delivery often results in otherwise avoidable illness, complications, or even death. Yet community-based health workers and other community members could be trained to better manage normal deliveries, to recognize danger signs, and to refer mothers in cases of obstetric complication. But training in and of itself is not enough; transport and emergency obstetric care must be available for back-up support.

■ **Immediate and exclusive breastfeeding:** Despite the proven benefits of immediate and exclusive breastfeeding, these practices are still the exception rather than the rule in

many countries. Over 80 percent of all newborns in Asia, for example, are not put to the breast at all within the first 24 hours.<sup>6</sup> While some cultures discourage early breastfeeding because colostrum (or first milk) is thought to be unclean, nursing the newborn immediately after birth provides much-needed immune defense, nutrients, warmth, and bonding with the mother—things every newborn needs to survive and thrive. Education on breastfeeding should be regularly included as part of prenatal, delivery, and postnatal care, emphasized in community-based behavioral change strategies, and supported by advocacy at national and regional levels.

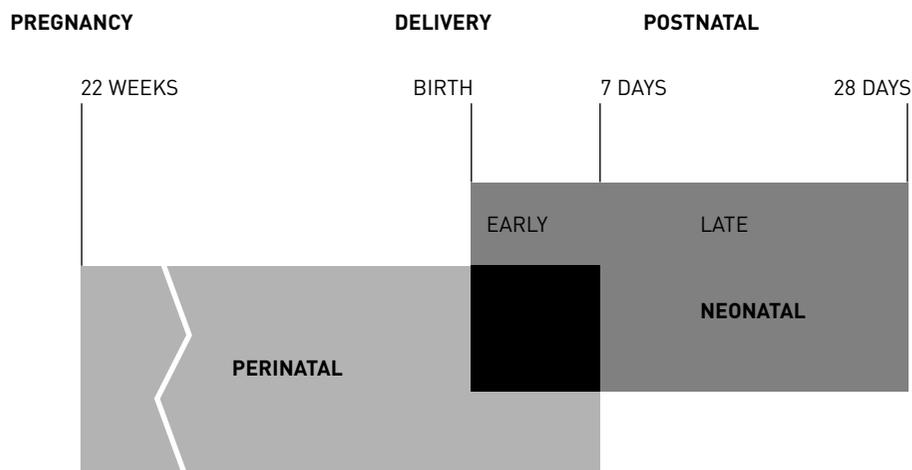
**THE WAY FORWARD: SAVING NEWBORN LIVES**

Policymakers, nongovernmental organizations (NGOs), health care professionals, and community leaders need to collaborate in strengthening

**TETANUS TOXOID IMMUNIZATION**

One success story comes from Bangladesh where death rates from neonatal tetanus have been reduced by 90 percent in just over a decade. With government commitment and support from a range of partnerships, a massive immunization campaign was launched in the mid-1980s, increasing coverage with tetanus toxoid vaccine from 5 percent in 1986 to 86 percent in 1998. Thanks to this increase, Bangladesh reduced neonatal tetanus death rates from 41 for every 1000 live births in 1986 to only 4 per 1000 by 1998.<sup>7</sup> BANGLADESH

FIGURE 1 PERINATAL AND NEONATAL MILESTONES



**STILLBIRTH** The death of a fetus weighing at least 500 grams (or when birth weight is unavailable, after 22 completed weeks of gestation or with a crown-heel length of 25 centimeters or more), before the complete expulsion or extraction from its mother.

**PERINATAL DEATH** The death of a fetus weighing at least 500 grams (or when birth weight is unavailable, after 22 completed weeks of gestation or with a crown-heel length of 25 centimeters or more) or the death of an infant during the first week of life.

**NEONATAL DEATH** The death of a live-born infant during the period that commences at birth and ends 28 completed days after birth.<sup>8</sup>

#### TRAINING IN ESSENTIAL CARE FOR NEWBORN HEALTH

**Another success story comes from the Gadchiroli district in India where the nonprofit organization SEARCH has trained village health workers and traditional birth attendants to provide appropriate health care for women during pregnancy, assistance in clean deliveries, proper response to complications for both mother and baby, as well as support for breastfeeding, care for low birth weight babies, and family planning. As a result, neonatal mortality has been reduced by approximately 60 percent through home-based care among isolated, rural villagers.<sup>9</sup> INDIA**

#### POLITICAL COMMITMENT

**“Africa needs intensive mobilization of people who have the power and means to reduce maternal and neonatal mortality on the continent.” This observation by Madame Adame Ba Konare, First Lady of Mali, represents the kind and level of advocacy needed to advance the newborn agenda. At a meeting in May 2001, the first ladies of West and Central Africa argued eloquently for “leadership and commitment from within Africa itself.” Conferences such as these are important for creating a policy environment favorable to health reform and for helping key agencies and individuals to move from rhetoric to action.<sup>10</sup> MALI**

existing health care delivery systems to provide expectant mothers and their newborns healthy alternatives to the chronic pattern of disease and death at the beginning of life.

A key part of this effort will be advocating for and creating policies at all levels that address the special needs of newborns. If newborn care programs are to receive the support they need—the kind of support currently available for reproductive health, child health programs, and communicable disease prevention, for example—they will need to become a national priority and figure prominently in national health plans and health reform programs. When policies are in place, then other needed changes are more likely to follow; for example, funding commitments, professional and technical changes such as revised national curricula and recruitment and deployment of staff, and the mobilization of nongovernmental organizations.

Another front in this effort will be to strengthen and expand proven cost-effective services. We can begin, in short, by doing more of what we know works and, wherever possible, doing it better, such as promoting tetanus immunization and breastfeeding, as noted above. We can also make a concerted effort to identify other feasible, cost-effective approaches to newborn care that can be easily replicated at the household and community level. Meanwhile, we can work on incorporating a newborn care component into existing safe motherhood and child survival programs, ensuring that postnatal care for mother and baby becomes as routine as prenatal care. Finally, we can add a newborn component to other ongoing health initiatives that also target mothers, such as family planning and prevention programs for sexually transmitted infections.

Another piece of this effort must be to mobilize the resources—finan-

cial, human, and material—that are available to improve newborn health. While this can mean supplementing existing resources, in many cases this is not realistic or even necessary. A first effort should be to ensure that the resources presently available are used as efficiently as possible. For example, there may be scope to reallocate resources within government health budgets to add those newborn health components that have been found to be cost-effective. Also, in countries where several NGOs and assistance agencies are working in health, better efforts to coordinate their activities will help to integrate these newborn health components. Nevertheless, to go to scale with the essential interventions for newborn health, most countries will require incremental resources that need to be provided on a long-term, sustainable basis.

We also need to collaborate with local organizations and research institutions to advance the state of the art of newborn care, identifying and testing promising new, low-cost approaches and technologies, and improving our understanding of cultural factors that affect community and household practices.

Collaboration must be a common thread in all of these efforts, working together in strategic partnerships with a wide range of institutions in developed and developing countries, including universities and other NGOs, government ministries, and international agencies. The potential for impact expands greatly whenever resources and experiences are shared.

All of these investments will pay off—and not just in reduced mortality rates. Evidence is growing that healthy newborns are more likely to be healthy adults, greatly reducing the social and economic costs of illness and disability. And when newborns survive, mothers are more

## SAVING NEWBORN LIVES: Recommendations for Improving Newborn Survival and Health



### CARE OF FUTURE MOTHERS

- Improve the status of women
- Improve women's health and family planning services
- Provide opportunities for female education and employment
- Improve the nutrition of girls
- Discourage early marriages and early childbearing
- Promote safer sexual practices



### CARE DURING PREGNANCY

- Improve the nutrition of pregnant women
  - Immunize against tetanus
  - Screen and treat infections, especially syphilis and malaria
  - Improve communication and counseling: birth preparedness, awareness of danger signs, and immediate and exclusive breastfeeding
- SPECIAL ATTENTION**
- Monitor and treat complications, such as anemia, preeclampsia, malpresentation, and bleeding
  - Promote voluntary counseling and testing for HIV
  - Reduce the risk of mother-to-child transmission (MTCT) of HIV



### CARE AT TIME OF BIRTH

- Ensure skilled care at delivery
  - Provide for clean delivery: clean hands, clean delivery surface, and clean cord care
  - Keep the newborn warm: dry and wrap baby immediately, including covering the head; or put skin-to-skin with mother and cover
  - Initiate immediate, exclusive breastfeeding, within one hour
  - Give prophylactic eye care, as appropriate
- SPECIAL ATTENTION**
- Recognize danger signs/serious complications in both mother and baby and avoid delay in seeking care and referral
  - Recognize and resuscitate asphyxiated babies immediately
  - Pay special attention to warmth, feeding, and hygiene practices for preterm and LBW babies



### CARE AFTER BIRTH

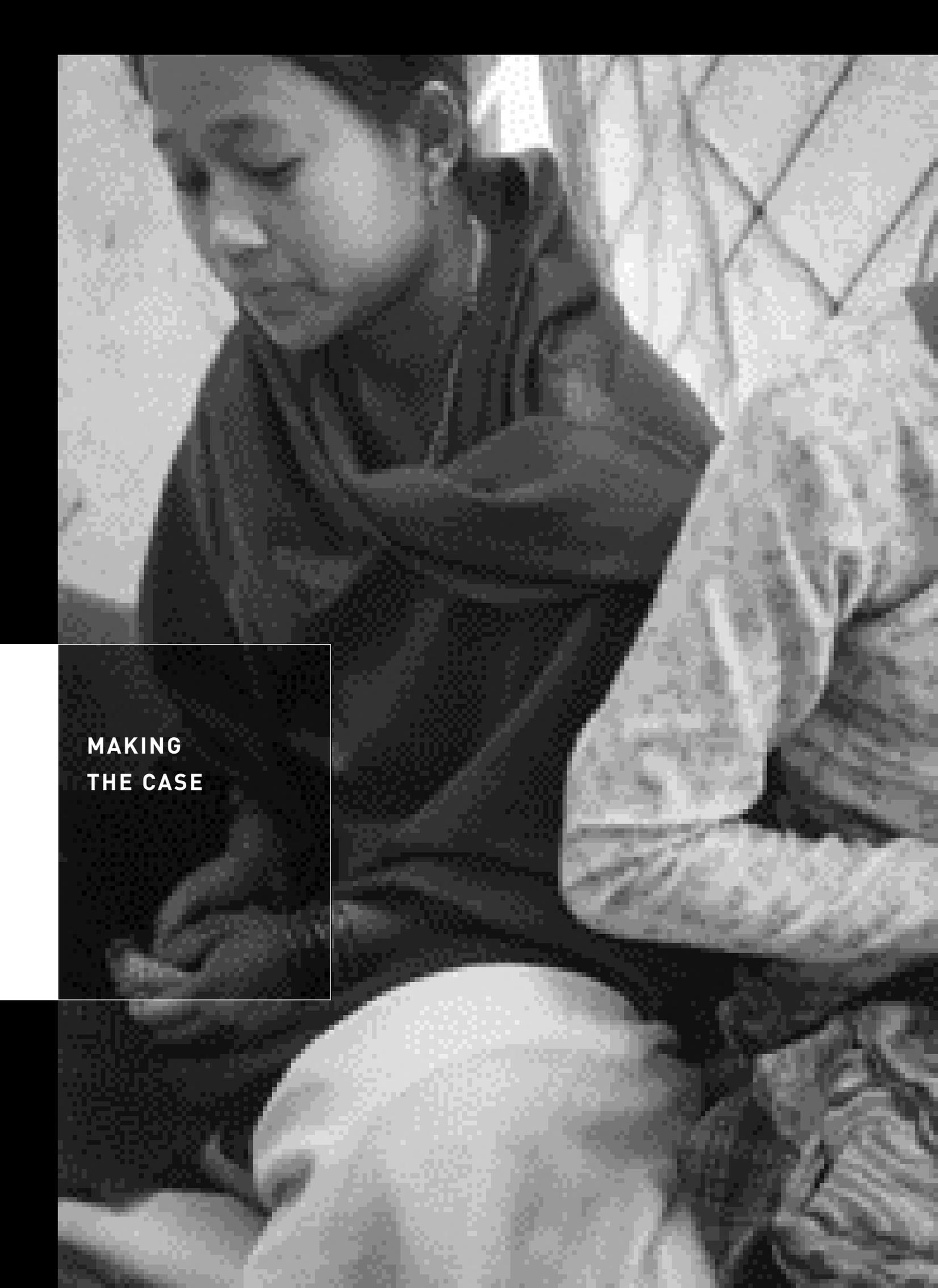
- Ensure early postnatal contact
  - Promote continued exclusive breastfeeding
  - Maintain hygiene to prevent infection: ensure clean cord care and counsel mother on general hygiene practices, such as hand-washing
  - Maintain warmth to prevent hypothermia
  - Provide immunizations such as BCG, OPV, and hepatitis B vaccines, as appropriate
  - Promote birth spacing
- SPECIAL ATTENTION**
- Recognize danger signs/serious complications in both mother and newborn, particularly of infections, and avoid delay in seeking care and referral
  - Support HIV positive mothers to make appropriate, sustainable choices about feeding
  - Continue to pay special attention to warmth, feeding, and hygienic practices for LBW babies

likely to space their pregnancies, thereby improving their own health as well as that of their children. This in turn leads to reduced fertility rates and contributes to the demographic transition from high to low fertility and mortality.

Reducing newborn and maternal mortality does not require medical

breakthroughs, expensive technology, or the makeover of national health care systems. Major strides can be made by putting existing solutions into general practice, while the search continues for the most effective way to bring about behavioral change and to treat certain complications, such as asphyxia, in

the newborn. With the support and collaboration of national decision-makers, community leaders, health care professionals, and assistance agencies, the world's newborns can receive the care and resources they need to survive and prosper.



**MAKING  
THE CASE**



Conservative estimates suggest that each year, at least four million babies die during the first 28 days of life—almost two-thirds of whom die within the first week and in particular during the first day. In other words, every minute, eight babies die before reaching one month of age. An additional four million are stillborn.<sup>11</sup>



**ABOVE** A woman in labor is brought to a local clinic by a bicycle ambulance. MALAWI

### **NEWBORN DEATH IS A MAJOR PROBLEM**

Deaths during the neonatal period (the first 28 days of life) account for almost two-thirds of all deaths in the first year of life, and 40 percent of deaths before the age of five (see “Two-Thirds Rule,” p.13). Current estimates suggest that 34 out of every 1,000 babies born in developing countries die before they reach one month of life.<sup>12</sup>

A disturbing feature of newborn mortality is the marked variation in rates between low-income and high-income countries (Table 1, p.14). For example, the neonatal mortality rate (NMR) in Mali is about 60 per 1,000 live births, compared to Sweden, where the rate is less than 3. The disparity between regions is even wider when we use the lifetime risk of a mother experiencing a neonatal death as the standard of comparison. A mother in western Africa, for example, has an approxi-

mately 30 percent risk of one of her babies dying in the first month, compared to a mother in Western Europe or North America where the likelihood is less than one percent. Almost a third of mothers in western Africa have lost at least one newborn baby—a commonplace but largely untold tale of grief.

The neonatal mortality rate (42 per 1,000) and the perinatal mortality rate (76 per 1,000) are highest in Africa, and neonatal mortality is highest of all in western Africa, at 54 per 1,000 live births. Asia actually has a lower average neonatal death rate (34 per 1,000), but because of that region’s higher population density, it accounts for 60 percent of the world’s neonatal deaths (Table 1, p.14). Preliminary results from a recent analysis found that the loss of healthy life from newborn deaths represented 8.2 percent and 13.6 percent of the burden of disease in sub-Saharan

Africa and South Asia, respectively.<sup>13</sup>

It should be noted here that measuring newborn mortality has been difficult (see note, Table 1, p.14). Even so, considerably more information is available today than was the case even a few years ago. Thus, available estimates such as those from the World Health Organization (WHO) indicate the magnitude of the problem rather than provide precise figures.<sup>14</sup>

### **HEALTHY NEWBORNS HAVE A HEADSTART IN LIFE**

While the alarming number of stillbirths and neonatal deaths is perhaps the most compelling reason to focus on newborns, another important reason is the fact that healthy newborns are likely to enjoy better health in childhood and in later life. Newborns who get off to an unhealthy start, especially low birth weight (LBW) and preterm babies, are particularly vulnerable to illness

and death during their first year. They may also develop disabilities and are generally less likely to reach their full potential, with unfortunate consequences for themselves, their families, and society as a whole.

A growing body of literature suggests that the intra-uterine environment “programs” aspects of chronic disease in adult life.<sup>15-18</sup> The “fetal origins hypothesis” has stimulated much debate and highlighted the importance of promoting in-utero health to prevent problems in later life such as diabetes, hypertension and cardiovascular diseases. This is particularly important as people live longer and these dis-

eases become more common in both the developed and developing world. There is also growing evidence for and interest in the influence of in-utero health on future cognitive development: LBW babies, for example, have been found to do less well than normal newborns on educational and intelligence tests.<sup>19</sup>

#### **NEWBORN DEATH AND DISABILITY ARE COSTLY**

*“This birth has cost me 2,000 rupees, and I have lost a grandson.”*

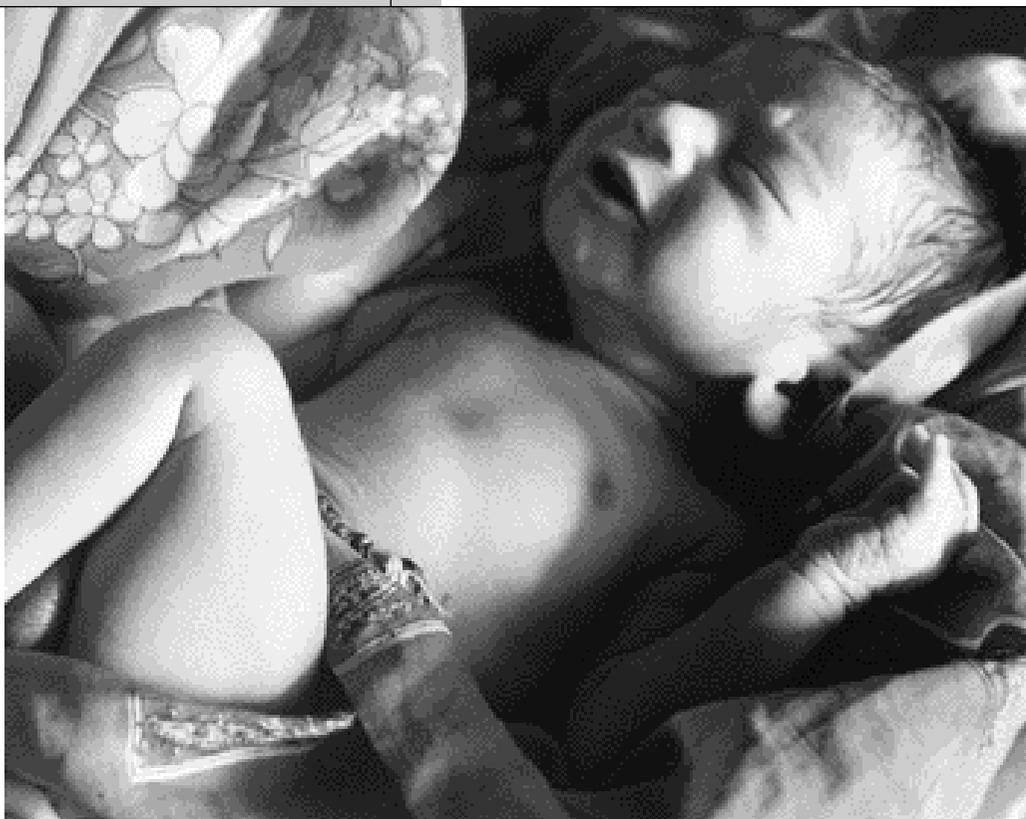
These words from a bereaved grandmother are a harsh reminder that there are economic and social

#### **DELAY IN SEEKING CARE**

**Chan brought her baby, Sopha, to the health center on the baby’s fifth day of life. Chan had noticed that the baby had redness around her umbilical cord from the second day after birth, but she was not able to seek health care because women and newborns are not allowed to leave the home until after the “dropping the stone ceremony”—a ritual symbolizing that the mother and newborn have survived the birthing process. By the time Sopha reached the health center, she had a very high fever and was not feeding. She died the next day, despite treatments with antibiotics.<sup>20</sup> CAMBODIA**

#### **THE “TWO-THIRDS RULE” ON GLOBAL INFANT MORTALITY RATES\***

- More than seven million infants die each year between birth to 12 months
- Almost two-thirds of infant deaths occur in the first month of life
- Among those who die in the first month of life, about two-thirds die in the first week of life
- Among those who die within the first week, two-thirds die in the first 24 hours of life



\* This rule applies only to the world average. Local proportions will depend on progress in addressing newborn relative to post-newborn deaths. Historically, as the number of infant deaths has fallen, the proportion of newborns has risen. SOURCE Data based on Hill 1999, WHO 2000, and WHO 2001<sup>21</sup>

**TABLE 1 SELECTED NEWBORN AND MATERNAL INDICATORS BY REGION, 1995-2000**

Region	Estimated number of live births per year (thousands) 1999	Estimated neonatal mortality rate per 1,000 live births circa 1999	Number of neonatal deaths (thousands) calculated <sup>a</sup>	Total fertility rate 1995-2000	Lifetime risk of a mother experiencing a neonatal death (%) calculated <sup>b</sup>
<b>AFRICA</b>	<b>28,685</b>	<b>42</b>	<b>1,205</b>	<b>5.0</b>	<b>21</b>
EASTERN AFRICA	10,057	41	408	5.8	24
MIDDLE AFRICA	4,107	39	162	6.2	24
NORTHERN AFRICA	4,607	32	147	3.6	12
SOUTHERN AFRICA	1,277	18	23	3.4	6
WESTERN AFRICA	8,636	54	465	5.5	30
<b>ASIA</b>	<b>76,090</b>	<b>34</b>	<b>2,561</b>	<b>2.6</b>	<b>9</b>
EASTERN ASIA	21,106	20	421	1.8	4
SOUTH-CENTRAL ASIA	38,442	46	1,753	3.4	16
SOUTH EASTERN ASIA	11,432	24	277	2.7	6
WESTERN ASIA	5,110	22	110	3.8	8
<b>EUROPE</b>	<b>7,374</b>	<b>6</b>	<b>44</b>	<b>1.4</b>	<b>&lt; 1</b>
EASTERN EUROPE	3,001	9	27	1.4	1
NORTHERN EUROPE	1,074	4	4	1.7	< 1
SOUTHERN EUROPE	1,405	5	8	1.3	< 1
WESTERN EUROPE	1,895	3	5	1.5	< 1
<b>LATIN AMERICA/CARIBBEAN</b>	<b>11,553</b>	<b>17</b>	<b>196</b>	<b>2.7</b>	<b>5</b>
CARIBBEAN	773	19	15	2.6	5
CENTRAL AMERICA	3,427	13	46	3.0	4
SOUTH AMERICA	7,354	18	135	2.6	5
<b>NORTHERN AMERICA</b>	<b>4,098</b>	<b>4</b>	<b>18</b>	<b>1.9</b>	<b>&lt; 1</b>
<b>OCEANIA<sup>c</sup></b>	<b>225</b>	<b>34</b>	<b>8</b>	<b>2.4</b>	<b>8</b>
<b>MORE DEVELOPED REGIONS</b>	<b>13,045</b>	<b>5</b>	<b>65</b>	<b>1.6</b>	<b>&lt; 1</b>
<b>LESS DEVELOPED REGIONS</b>	<b>116,550</b>	<b>34</b>	<b>3,970</b>	<b>4.9</b>	<b>17</b>
<b>WORLD</b>	<b>129,596</b>	<b>31</b>	<b>4,035</b>	<b>2.7</b>	<b>8</b>

<sup>a</sup>Definitions of the indicators and sources of data are listed in the appendix. NMR is based on WHO estimates for 2001 using data collected circa 1999. The number of neonatal deaths was calculated by multiplying the number of live births (1999 estimates) by the NMR (2001 estimates). TFR is from UNFPA 2000.

<sup>b</sup>The lifetime risk of a mother experiencing a neonatal death is calculated by multiplying the neonatal mortality rate by the total fertility rate. This is a simplification of complex statistical interactions between fertility and neonatal deaths, but is used to illustrate the dramatic differences by sub-region.

<sup>c</sup>Japan, Australia and New Zealand have been excluded from the regional estimate but are included in the total for developed countries.

Very few countries in the developing world have a reliable system for registering births and deaths. While surveys by governments and international agencies attempt to estimate the size of the problem, there are many sources of potential error, such as the under-reporting of newborn deaths and stillborns, and inaccuracies in fixing the time of deaths (i.e., classifying neonatal deaths as stillbirths). Other problems include the reluctance of mothers to talk about infant deaths for cultural reasons and the fact that the populations surveyed are often in easy-to-reach, relatively advantaged areas, thus introducing questions of sample bias and a tendency to underestimate the problem.

costs associated with poor newborn health. The family incurs the cost of health care during pregnancy and delivery, and if the newborn dies, the additional costs of the funeral and burial. Caring for a disabled or sick child can consume the family budget and, in many cases, is an added burden on family members who would otherwise work and make money. Disabled and sick newborns add to local and national health care costs, stretching already scarce resources. The social costs are harder to quantify. A newborn death is a distressing emotional experience for the new mother and her family, and it is also a social stigma in many cultures.

#### **NEWBORN SURVIVAL CONTRIBUTES TO LOWER BIRTH RATES, THE HEALTH OF THE MOTHER, AND THE HEALTH OF SUBSEQUENT NEWBORNS**

There is evidence of a strong association between newborn and infant mortality and birth interval, with higher mortality for infants born less than 18 months apart.<sup>22</sup> And there is related evidence that when a newborn dies, many mothers are inclined to enter more quickly into another pregnancy in order to provide a “replacement” baby. When a newborn survives, therefore, the mother is more apt to space her pregnancies, thus contributing to her own improved health and the health of her fetus, and by lengthening the birth interval, increasing the survival chances of the next child. At the same time she also contributes to the “demographic transition” from high fertility and mortality to low fertility and mortality.<sup>23</sup>

#### **STILLBIRTHS**

Behind closed doors in Mangochi District Hospital, a woman is waiting. Lukia Idrusi has just been told that 32 hours ago she gave birth to a stillborn baby girl. Although Lukia had been anxiously asking about her baby ever since she came round from her operation, neither the nurse in charge nor her grandmother felt that she was well enough to accept the news until now. Lukia had realized that something was wrong almost immediately following the onset of labor. “The labor went on for hours and hours and then I could feel something bursting inside of me. At that point I stopped feeling labor pains,” she explains. A clinical examination confirmed that the uterus had ruptured and the fetal heartbeat had stopped.<sup>24</sup> MALAWI



**ABOVE** An early postnatal visit provides the opportunity to promote healthy practices and address complications. MALAWI

**WOMEN CAN BE  
RELUCTANT TO SEEK CARE**

Mira's baby girl was born in the doorway of her mud-covered stone house with her sister and sister-in-law supporting her. The umbilical cord was cut with a new blade, after which mustard oil was rubbed into the stump. "I didn't go to the health post for check-ups," says Mira, "because I was shy of someone seeing my belly." Even if there had been complications, the family insists that they wouldn't have taken her to the hospital. "We're poor and prefer to die in our own houses," says Madan, Mira's husband. NEPAL

**IMPROVED NEWBORN CARE WILL  
LEAD TO REDUCED INFANT AND  
CHILD MORTALITY**

Infant and child mortality rates have dropped significantly over the last two decades through reducing post-neonatal deaths due largely to diarrhea, pneumonia, vaccine-preventable infections and malaria. As a result, neonatal and especially early neonatal deaths now represent a much larger proportion of the overall total infant mortality rate. Further reductions in infant and child mortality will now depend on improving the care of newborns.

In India, for example, infant mortality declined by half between 1960 and 1990.<sup>25</sup> Since then, the infant mortality rate has stagnated (Figure 2) and further reductions will depend largely on national newborn care strategies.

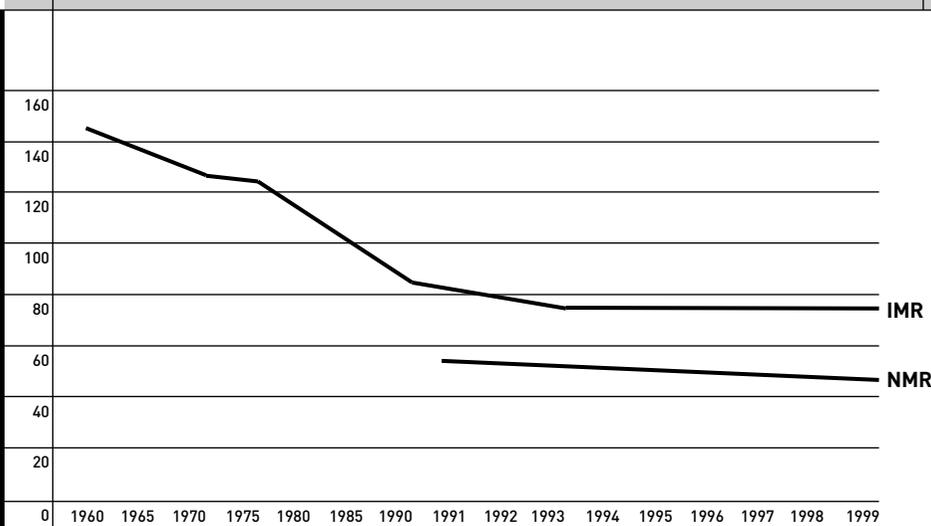
**WHY WE HAVEN'T DONE  
MORE FOR NEWBORNS**

Given such a strong case for improving newborn health, why has the state of newborns not received more attention? To begin with, there is widespread under-reporting of stillbirths and early newborn deaths, which means that policymakers simply do not have the information that would make the problem visible to them. Due to the lack of good data, WHO often uses "models" to estimate the numbers of neonatal and fetal deaths, yielding estimates that may be less than the actual numbers. The cry is rising in the field of neonatal health: Every life counts, so count every birth and death.

In some cultures a birth is not considered "complete" until some time after the first critical days or weeks of life when a ceremony is performed. Until then, mother and

Infant mortality rates have stagnated in India, largely because newborn deaths continue unabated even though post-neonatal deaths have declined.

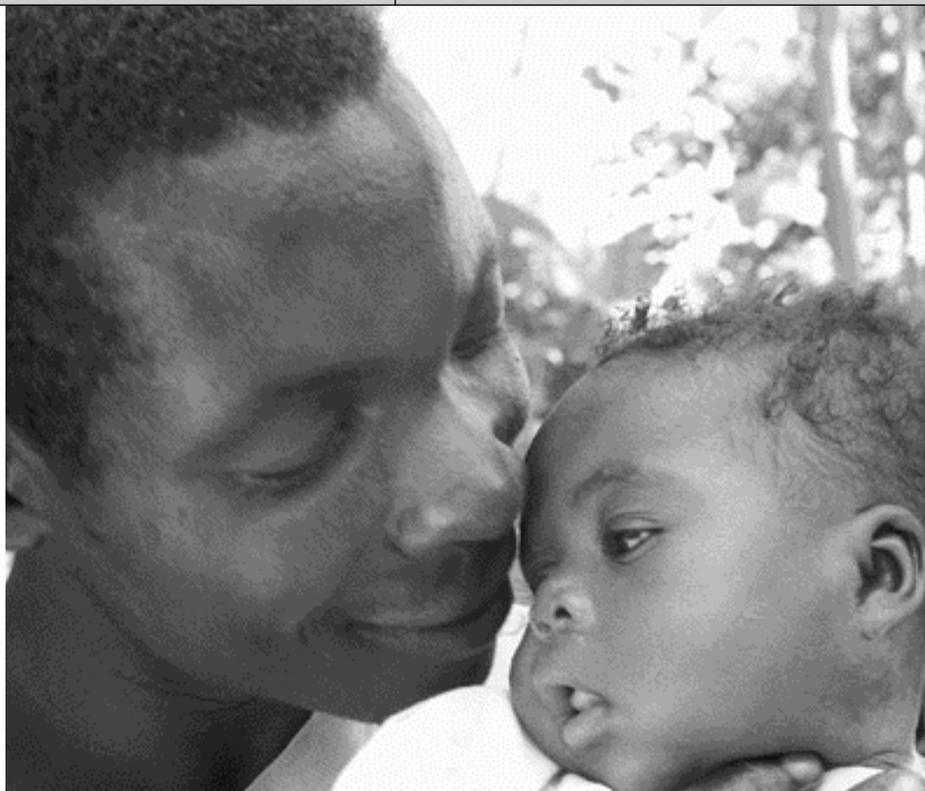
**FIGURE 2 INFANT AND NEONATAL MORTALITY RATES IN INDIA  
(PER 1,000 LIVE BIRTHS), 1960-1996**



SOURCE Ministry of Health, India and 'Trends in Childhood Mortality in the Developing World 1960-1996' UNICEF 1999.

## DEMYSTIFYING NEWBORN CARE

- Newborn health *is* a priority in developing countries
- Newborn care does not require high-tech hospital units and specialists
- Newborn care is not just a mother's responsibility
- Newborn care is affordable
- Newborn mortality can be reduced even when socio-economic development has not occurred
- Newborn health is essential for future improvements in child health



baby may be secluded within the home, contributing to the “invisibility” of the newborn.

There is also the widespread, mistaken assumption that the problems of newborns are being addressed by safe motherhood and child survival programs. The reality in many cases is that newborns have benefitted little from the “child survival revolution” and that the neonatal period has for some time been orphaned between these two programs.

### **COST-EFFECTIVE SOLUTIONS EXIST**

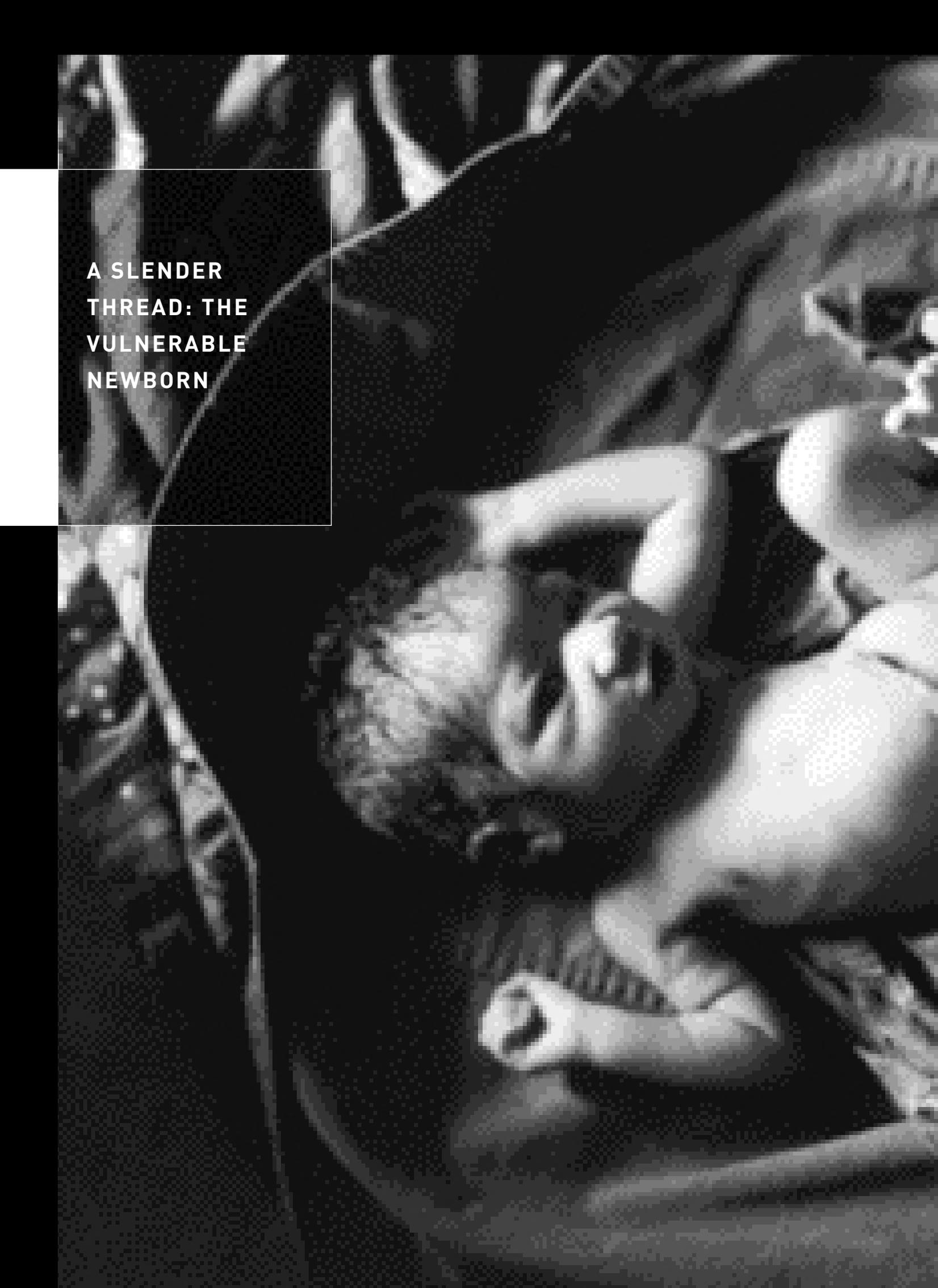
If improving newborn health were a matter of making medical or scientific breakthroughs, building expensive health care infrastructures, or purchasing expensive high-tech

ventilators and incubators, then the reluctance to take up the cause of newborns might be more understandable. But it is not. Experience in developed nations has shown that neonatal and perinatal mortality rates fell most dramatically long before neonatal intensive care units came into existence, thanks to relatively simple, low-cost interventions such as better maternal and obstetric care, better routine newborn care, and the introduction of antibiotics.

Low-cost, proven interventions can be carried out entirely within the framework of existing maternal and child health programs. Current reviews indicate that essential care during pregnancy, childbirth, and the newborn period costs an estimated

US\$3 a year per capita in low-income countries.<sup>26</sup>

Improving newborn health is not a matter of developing solutions to the problems; it is a matter of applying existing solutions via existing mechanisms. The real challenge is to spread the awareness of sound newborn health practices to those who need it, especially mothers, other primary caregivers, and health providers. But to do that will require getting the plight of newborns on national and international agendas and finding the resources to put proven solutions into practice.



A SLENDER  
THREAD: THE  
VULNERABLE  
NEWBORN



We need to do more to improve the survival rate and general health of the world's newborns. The most important reason, of course, is to save lives and ensure the well-being of future generations, but there are other compelling reasons why the plight of newborns merits a prominent place on the international health agenda.

#### TRADITIONAL BELIEFS AND CLEAN DELIVERY PRACTICES

In Cochabamba, Bolivia, birth attendants have traditionally used a stone or a piece of clay pot to cut the newborn's umbilical cord after birth. All attempts to persuade families to use a sterile knife or razor blade failed. Then a study of traditional birthing practices revealed that people living in the region believe that cutting the cord with a knife or blade would cause the baby to grow up to be a thief. Since then, families have been educated to sterilize stones by boiling them, thereby respecting tradition but preventing infection.<sup>27</sup>

**BOLIVIA**

#### DIRECT CAUSES OF NEONATAL DEATH

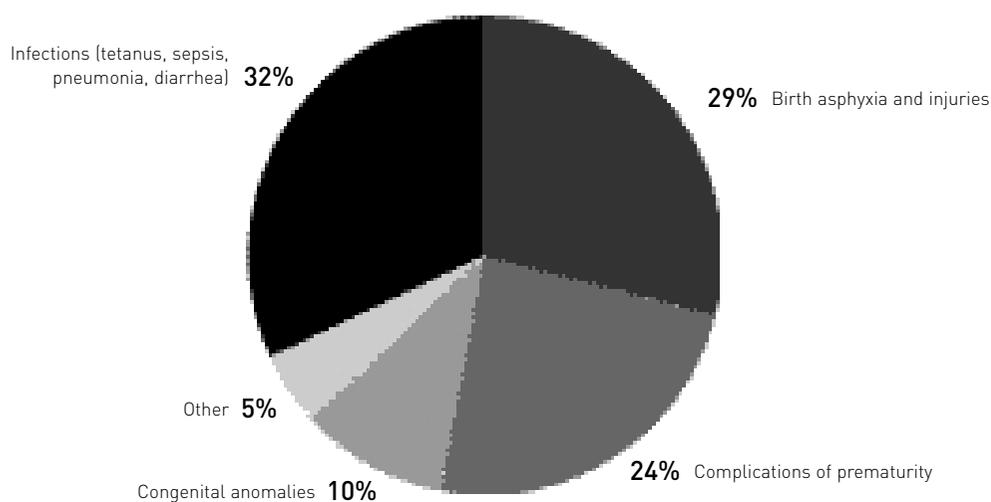
Determining why newborns die in developing countries is difficult because most deaths occur at home, and families are often reluctant to seek outside help for a sick child for a variety of socio-cultural, logistical and economic reasons. The data we have, however, point to four main causes of neonatal death: infections (tetanus, sepsis, pneumonia, diarrhea), complications during delivery (leading to birth asphyxia and birth injuries), congenital anomalies, and complications of prematurity (Figure 3). While this is indeed a sad litany of disease, it is noteworthy—and encouraging—to see that most of these causes of death are readily preventable via proven, low-cost solutions.

Every year, an estimated 30 million newborns acquire a neonatal infection, and between one and two million of those infected die.<sup>28</sup> The

most common of these infections lead to neonatal tetanus, sepsis, pneumonia and diarrhea, which together account for 32 percent of neonatal deaths. Where hygiene is poor, newborns may become infected with bacteria leading to serious infections in the skin, umbilical cord, lungs, gastrointestinal tract, brain, or blood. Neonatal tetanus has been eliminated today in over 100 countries through immunizing mothers with tetanus toxoid, ensuring clean delivery practices, and maintaining clean cord care.<sup>29</sup> Early and exclusive breastfeeding also contributes to reduced neonatal mortality from infections.<sup>30</sup>

Another common cause of high neonatal mortality in developing countries is complications during delivery, which lead to asphyxia (the inadequate supply of oxygen immediately before, during, or just after

FIGURE 3 DIRECT CAUSES OF NEONATAL DEATHS



SOURCE WHO 2001 estimates (based on data collected around 1999).

birth) and other birth injuries. Prolonged or obstructed labor, a common phenomenon in such countries, is a leading cause of birth asphyxia. The WHO estimates that between four and nine million newborns develop birth asphyxia each year. Of those, an estimated 1.2 million die and at least the same number develop severe consequences, such as epilepsy, cerebral palsy, and developmental delay.<sup>31</sup> Prompt detection and management of obstetric complications can prevent many of these deaths and disabilities.

Congenital anomalies are the fourth most common cause of newborn deaths, a category that includes neural tube defects, cretinism, and congenital rubella syndrome. Neural tube defects are preventable if pregnant mothers are given folic acid during the first three months of pregnancy. Cretinism can be avoided by providing mothers with adequate iodine, and congenital rubella syndrome can be prevented by immunizing mothers against rubella.

#### **DIRECT CAUSES OF FETAL DEATH**

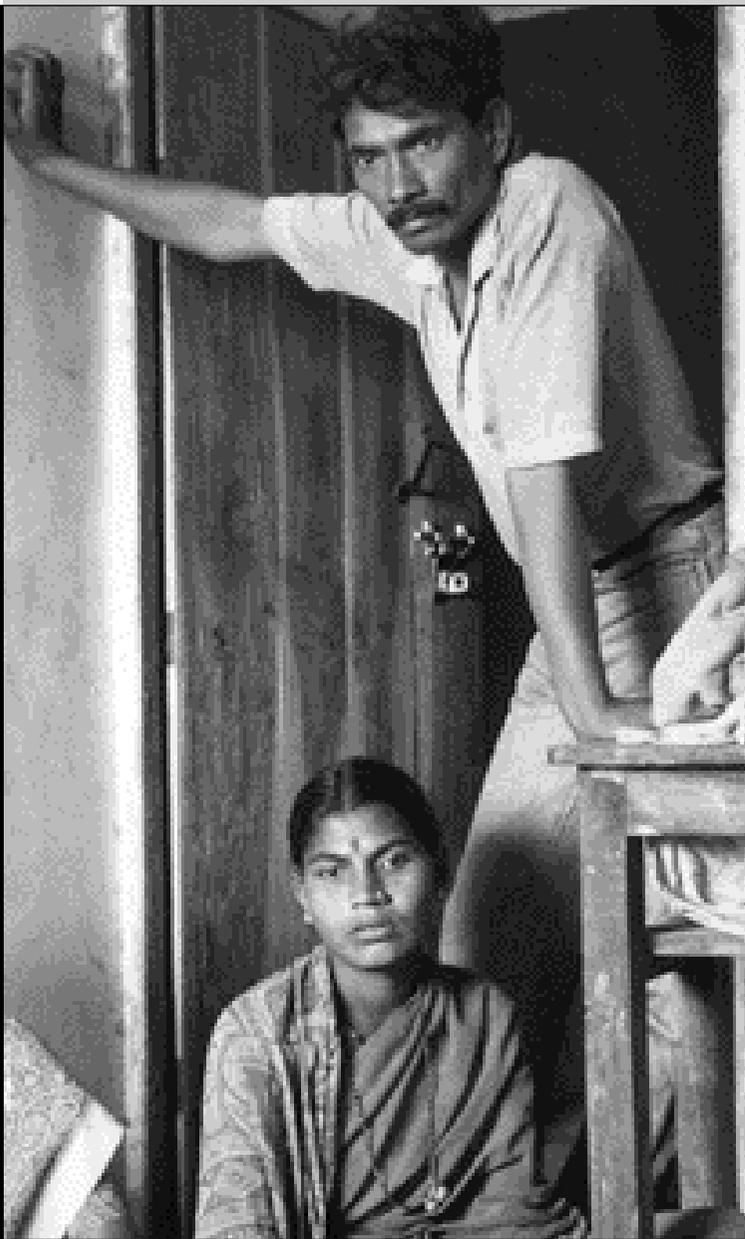
There are two types of fetal death: fresh stillbirths, which occur within the uterus during labor or delivery, and stillbirths, which occur within the uterus before the onset of labor. The former are caused almost exclusively by a lack of oxygen due to problems during labor, and the latter are most commonly due to maternal infections, such as syphilis, and congenital abnormalities.

#### **INDIRECT CAUSES OF NEONATAL MORTALITY: THE INFLUENCE OF LOW BIRTH WEIGHT (LBW)**

Birth weight strongly influences the chances of the newborn to survive and thrive. Not surprisingly, LBW (a weight of less than 2,500 grams at birth) is the most important indirect cause of neonatal mortality and morbidity. Between 40 percent and



**ABOVE** Low birth weight babies are vulnerable to a range of life-threatening conditions, including infections such as sepsis, pneumonia, and diarrhea. MALAWI



**ABOVE** In many developing countries, girls and women face inequality in access to education, health care, and employment opportunities. INDIA

80 percent of neonatal deaths occur among LBW babies,<sup>32</sup> and those who do survive are subject to poor growth and increased rates of illness from infectious diseases in infancy and childhood, as well as compromised cognitive and behavioral development. WHO estimates that 17 percent of newborns in developing countries suffer from LBW, compared to 6 percent in industrialized countries (see Appendix, Table I for LBW rates by country).

LBW infants have a much greater risk of dying in the newborn period. In a recent study of such infants in Bangladesh, the overall LBW newborn mortality rate was 133 per 1,000 live births. As birth weight decreased, the mortality rate increased: the rate for infants weighing 2,000–2,499 grams was 52 per 1,000; for those weighing 1,500–1,999 grams, 204 per 1,000; and for those weighing less than 1,500 grams, 780 per 1,000. Pre-term LBW infants were five times as likely to die as term LBW infants.<sup>33</sup>

LBW is most commonly caused by short gestation, intra-uterine growth retardation (IUGR), or both. However, the causes of LBW are complex, often stemming from the effects of generations of poverty. In general, the health and nutrition of the mother are key factors. The mother's pre-pregnancy weight, for example, influenced by her life-long nutritional status and even that of her mother and grandmother, contributes to LBW, as does a fear of obstructed labor and the related practice of "eating down," the idea held by some mothers that eating less will result in smaller babies, hence easier, and less risky, labor.

LBW can also result from untreated maternal infections—malaria, urinary tract infections, bacterial vaginosis, and sexually transmitted infections (STIs), such as syphilis, gonorrhea, chlamydia,

TABLE 2 **LOW BIRTH WEIGHT BY REGION 1995-99**

Region	LBW rate [%] 1995-99	Estimated number of LBW babies per year (thousands)
SUB-SAHARAN AFRICA	15	3,607
MIDDLE EAST/NORTH AFRICA	11	1,024
SOUTH ASIA	31	11,061
EAST ASIA/PACIFIC	8	2,611
LATIN AMERICA/CARIBBEAN	9	1,031
CEE/CIS AND BALTIC STATES*	7	448
LESS DEVELOPED COUNTRIES	17	19,782
INDUSTRIALIZED COUNTRIES	6	586
WORLD	16	20,368

\*CEE: Central and Eastern Europe, CIS: Commonwealth of Independent States  
 Countries grouped by United Nations regions  
 SOURCE adapted from State of the World's Children 2001, using UNICEF and WHO data 1995-2001

and HIV. Other common causes of LBW include demanding physical work, cigarette use, indoor pollution, and alcohol and drug use. Short spacing between pregnancies also seems to be associated with LBW,<sup>34</sup> as is adolescent pregnancy. Once again, it should be noted that most causes of LBW are treatable or preventable through improving maternal health and nutritional status. Treatment of LBW babies requires special attention, particularly with regard to warmth, feeding, hygiene practices, and prompt treatment of infection.

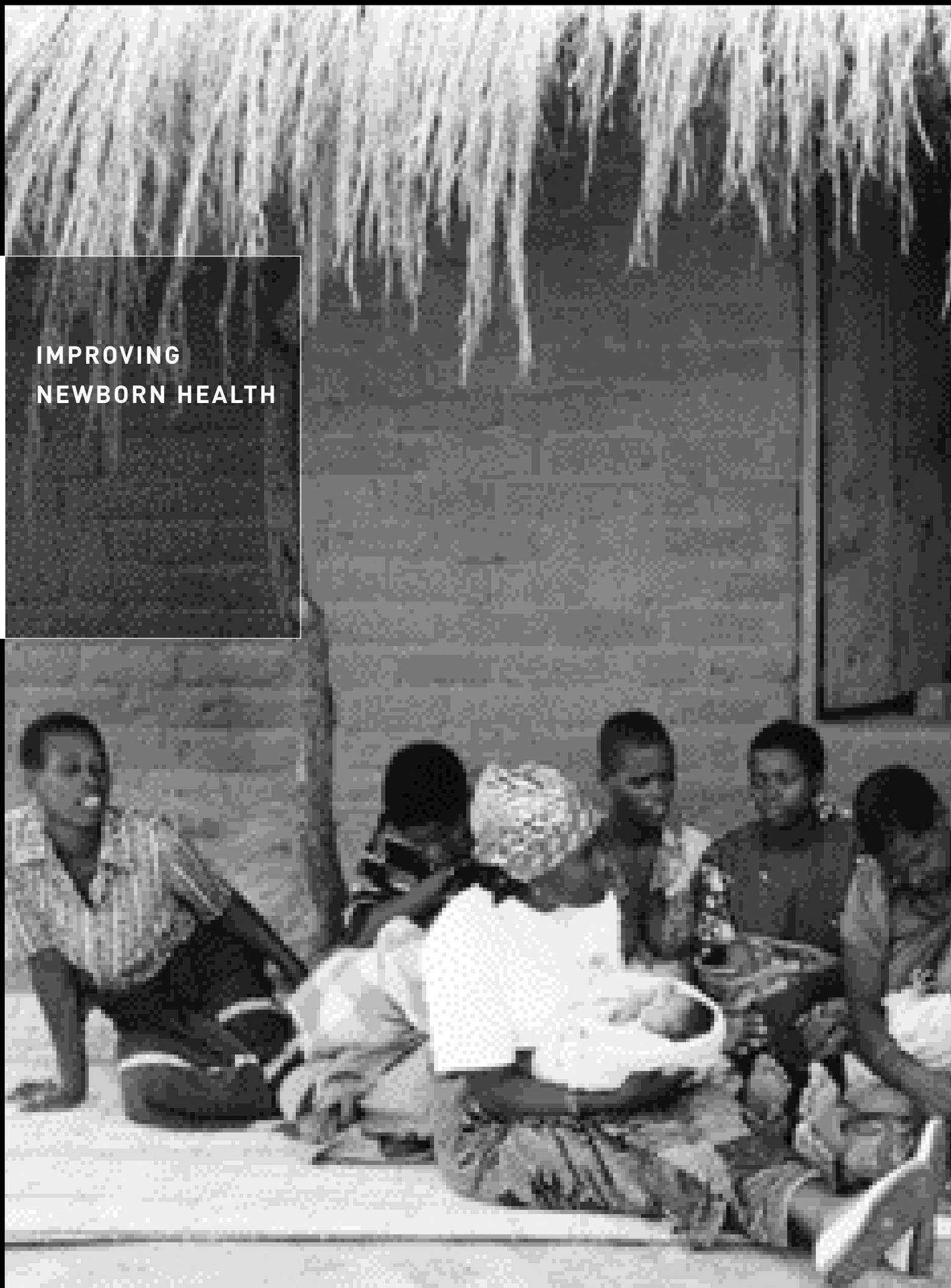
**GENDER BIAS**

Gender bias refers to a preference for male children in some cultures and a corresponding discrimination against and neglect of females. Sur-

veys in some districts of South India, for example, have shown that early newborn mortality among girls is nearly double the rate for boys.<sup>35</sup> Other studies have shown that referrals of girl babies for special care are fewer than for boys. In extreme cases, gender bias can be life-threatening: sex-selective abortion, female infanticide, and the neglect of the girl-child are responsible for an estimated 60 million "missing" girls, mostly in Asia.<sup>36</sup>

*State of the World's Mothers*, a report published by Save the Children in May 2000, presents country-by-country data on indicators reflecting the status of women through their access to health care, education, and economic resources.<sup>37</sup>

**IMPROVING  
NEWBORN HEALTH**





Improving the health of newborns is largely a matter of applying sound health care practices at the appropriate milestones in the development of a newborn: that is, during pregnancy, at the time of birth, and after birth up through the first 28 days. A truly effective approach to newborn health would start even earlier, of course, by addressing the health of future mothers.

**BLAME FOR PROBLEMS  
OFTEN FALLS ON MOTHERS**

**Gopini shows little sympathy for her daughter-in-law who has left for a two-month stay at her mother's house following the stillbirth of her first son. There has always been friction between Gopini and her daughter-in-law, and the death of her grandson only adds to her enmity. She cannot understand why the baby died, since she herself gave birth to a breech baby 20 years ago without problems. "My daughter-in-law was very lazy, she was always sleeping," she says. "Perhaps because of this the baby didn't have enough space to move." NEPAL**

**DEMANDS OF HARD, PHYSICAL WORK  
CONTINUE THROUGH PREGNANCY**

**Mangala has no idea why she is susceptible to low birth weight, premature babies. If you ask her whether she took care during pregnancy, she is nonplussed. "How can I take care?" she says. "I'm always working, picking rice and pulses (lentils), digging pits and fetching water. I was in the fields until two hours before my baby was born." INDIA**

**CARE OF FUTURE MOTHERS:  
IMPROVING THE STATUS AND  
HEALTH OF WOMEN**

Small girls grow into small women, who develop into underweight mothers who have undernourished babies, resulting in a cycle of ill health and high death rates.<sup>38</sup> The causes of the undernourishment and ill health of many women are complex. In many societies, girls are uniquely disadvantaged, their options in life limited by illiteracy, poor education, and lack of employment opportunities. They are often burdened with heavy workloads, have lesser claims on scarce resources, and may not be free to make their own decisions regarding access to health care or their own fertility.

Improving the status and health of girls and women is clearly a long-term challenge, one that will require the support of and coordination among individuals in numerous sectors, including health, education, and human rights. Changes in social and cultural beliefs and practices will also be necessary to support needed improvements in the status and health of future mothers.

The ultimate objective is to teach succeeding new generations of girls that their health—and that of their children—will depend on improving nutrition, delaying marriage and childbirth beyond the customary age, and ensuring that they and their partners use safer sexual practices. All of these goals can be furthered by providing educational opportunities for girls.

**CARE DURING PREGNANCY**

Caring for newborn babies starts with caring for their pregnant mothers, ensuring that pregnant women are adequately nourished, free from infections and exposure to harmful substances, and monitored for complications during pregnancy. However, the harsh realities of everyday life

for many pregnant women make it difficult for them to put these sound recommendations into practice (see Appendix, Table II, Percent of pregnant women with at least one antenatal visit).

**Improve pregnant women's nutrition**

A malnourished mother not only endangers the health of her fetus but also her own health, increasing the likelihood of infection and disease. Short-term options for improving the nutrition of mothers include:

- promoting a healthy and varied diet through an adequate supply and equitable distribution of food;
- supplementing pregnant women's diets through food-based or manufactured supplements or fortified foods;
- reducing work loads;
- spacing pregnancies; and
- treating conditions such as malaria and worms.

Over the long term, the nutrition of pregnant women can be improved by studying how these women live. We also need to better understand the demands on their energy and time and to take into account their needs as they perceive them.<sup>39</sup>

Providing food supplements has been a common component of programs to improve maternal nutrition. In the 1960s and 1970s, there were several attempts to analyze the effect of such programs on neonatal outcomes, but most studies showed relatively small effects on birth weight and perinatal mortality. The cost-effectiveness of these approaches was also called into question, and further troubles arose over claims of "culture clash," referring to situations where women chose to restrict eating in the belief that having a smaller baby would contribute to a safer and easier birth. For these reasons, food supplementation programs were largely discredited and never introduced on a broad scale.

## CARE OF FUTURE MOTHERS

- Improve the status of women
- Improve women's health and family planning services
- Provide opportunities for female education and employment
- Improve the nutrition of girls
- Discourage early marriages and early childbearing
- Promote safer sexual practices



A recent study from the Gambia, however, has reopened the debate. Undernourished pregnant women were given supplements in the form of a groundnut-based biscuit that provided an extra 900 calories per day and added calcium and iron. The women also received prenatal care, including iron and folate supplements, tetanus toxoid immunization if needed, and chloroquine during the malaria season. Overall, there was a 35 percent decrease in LBW babies and a 49 percent reduction in perinatal deaths among women receiving supplements compared with those who did not.<sup>40</sup>

Increasing the intake of vitamins and micronutrients during pregnancy has also produced promising results. Recent studies of interventions to reduce anemia in pregnancy have demonstrated the beneficial effects of iron and folate supplements, along with anti-worm treatment.<sup>41</sup> In one study, adding iodine to a water supply in China reduced neonatal mortality by approximately 50 percent.<sup>42</sup> Other studies suggest

that zinc supplements during pregnancy improve infant outcomes, particularly among LBW infants.<sup>43,44</sup> Supplementation of women of reproductive age in Nepal once weekly with vitamin A reduced pregnancy-related maternal mortality by 40 percent, and modestly reduced maternal morbidity and anemia.<sup>45</sup> In other studies, maternal night blindness, indicative of vitamin A deficiency and present in 10-20 percent of women in some populations, was associated with more severe infections, anemia, increased infant deaths, and increased risk of maternal mortality for up to two years after giving birth.<sup>46</sup> Although maternal vitamin A supplementation did not impact infant mortality through 6 months of age, vitamin A supplementation of newborns immediately after birth may be a promising strategy.<sup>47,48</sup>

Ideally, the broad use of food and vitamin supplements to improve maternal nutrition should be part of a wide-scale development effort aimed at alleviating poverty, ensuring household food security, pro-

moting healthy diets, and defending gender equity. In those cases where supplements are the only intervention, however, the most important supplements to include in an antenatal care package are iron and folate, and, in some regions, vitamin A, iodine, and zinc. The use of multiple micronutrient supplements during pregnancy, a common practice in the industrial world, is now undergoing evaluation in several developing countries.

Adding micronutrients (such as iron, vitamin A, and iodine to fortify flour and other staples) can be a simpler and quicker means of improving nutritional status than changing diets. However, for this strategy to be effective, fortified foods must be readily available, relatively inexpensive, and widely consumed by the target population.

### **Immunize against tetanus**

As noted earlier, neonatal tetanus is an important cause of newborn death. Tetanus toxoid vaccination protects women against tetanus infection

## CONTROLLING MALARIA AND OTHER INFECTIONS IMPROVES BOTH MATERNAL AND NEWBORN HEALTH

In the past five years, 28-year-old Margaret Edward has lost two children to malaria before their third birthday. Now, Margaret clutches her newborn baby girl to her chest, praying that malaria will not take this child too. But this time she needn't worry.

Five weeks ago, Margaret herself came down with malaria in the third trimester of her pregnancy, but fortunately a vigilant traditional birth attendant spotted the signs and sent her to the local district hospital. Thanks to prompt diagnosis and treatment, Margaret has delivered a healthy baby. MALAWI

during pregnancy and ensures that mothers pass this immunity to their unborn children. In this way, babies are protected against tetanus during the first two months of life, up to the age when they themselves can be immunized against the disease. Where possible, immunization programs should be initiated as early as adolescence.

Tetanus toxoid is one of the cheapest, safest, and most effective vaccines. It costs about US\$1.20—a sum that includes the purchase and delivery costs of three doses of vaccine. Three doses of tetanus toxoid ensure 10–15 years protection for a woman and immunity for her newborns during the critical first two months of life. Five doses ensure a lifetime of protection for the mother.<sup>49</sup> Yet only about 52 percent of pregnant women in developing countries are now fully immunized (see Appendix, Table II, Percent of pregnant women with at least two toxoid immunizations).<sup>50</sup> This is one proven intervention that we need to more effectively implement.

### Screen and treat infections

Infections during pregnancy are a major cause of complications, such as spontaneous abortions, premature rupture of fetal membranes prior to labor, preterm birth, and congenital infection and anomalies.

Prevention and treatment should be part of antenatal care.

**Sexually transmitted infections** Gonorrhea can cause infant blindness, while active syphilis is associated with spontaneous abortions, a high rate of perinatal death, and other conditions, including developmental delay. Testing for sexually transmitted infections and providing appropriate treatment should be included in all antenatal care. In most developing countries, screening and treatment for syphilis is simple and inexpensive, with significant payoffs for newborn health.

**Malaria** In regions where it is highly endemic, malaria may cause up to 30 percent of preventable LBW and 3–5 percent of neonatal mortality. Malaria is also associated with an increased risk of spontaneous abortions and stillbirths and is linked with maternal anemia. These complications can be reduced by providing intermittent presumptive treatment during antenatal visits.<sup>51</sup> Use of bednets impregnated with insecticide has also been proven to be effective in preventing malaria.<sup>52</sup>

### Improve communication and counseling

Families and communities can find solutions to make birth safer and establish a referral and transport plan if emergencies arise during

labor. Counseling can help the pregnant woman and her family take steps to:

- ensure skilled care at the birth
- select a place of birth according to anticipated pregnancy complications
- learn danger signs and when and where to seek care
- highlight the advantages of early and exclusive breastfeeding
- alert the mother to any obstacles that might make it difficult to ensure a safe delivery

## SPECIAL ATTENTION

### Monitor and treat pregnancy complications

Many pregnancy-related complications could be managed appropriately if they were detected in time. Anemia, for example, can often be prevented with iron and folate supplements; urinary tract infections, reproductive tract infections, and maternal hypertension/preeclampsia can be treated. However, cases of severe intra-uterine growth retardation (IUGR), malpresentation or abnormal lie of the fetus, and multiple pregnancies should be referred to facilities better equipped to deal with problematic births and LBW newborns. A woman with a history of serious obstetric or medical complications should also be monitored closely.

Obstacles that keep pregnant mothers away from antenatal services need to be identified and overcome. Many factors could discourage women from taking advantage of maternal health care, such as dissatisfaction with the attitude of staff, the time, costs, and difficulties associated with reaching the service location, and the preference of many women to be seen only by a female health worker.

Problems are often compounded by some women's natural shyness and the belief that pain is a natural part of pregnancy and birth. "I had

pain, strong stomach pain and couldn't sleep," a mother in rural India noted, speaking of the premature birth of twins who died soon after delivery. "The next day the pain was still there. I plastered the house hoping the pain would go, but I did not tell anyone. I thought maybe this was normal."

**Promote voluntary counseling and testing for HIV**

Counseling would also be appropriate where voluntary testing for HIV is available. This would include providing infant-feeding counseling for mothers living with HIV/AIDS so that they can make informed decisions about feeding alternatives.\*

**Reduce the risk of mother-to-child transmission (MTCT) of HIV**

Up to one-third of untreated HIV-positive mothers will transmit the virus to their infant in the perinatal period.<sup>53</sup> While AZT (an anti-HIV drug) given during pregnancy has been shown to reduce mother-to-child transmission, families in many developing countries cannot afford this intervention. Shorter courses of treatment with AZT or Nevirapine around the time of delivery might be a more realistic solution,<sup>54</sup> provided that the resources are available.

The decision of whether and how to address mother-to-child transmission of HIV requires careful thought and discussion. For any approach to work, women would need to know their HIV positive status, in order to be informed about how to provide proper care for themselves and their babies.

**CARE DURING PREGNANCY**

- Improve the nutrition of pregnant women
- Immunize against tetanus
- Screen and treat infections, especially syphilis and malaria
- Improve communication and counseling: birth preparedness, awareness of danger signs, and immediate and exclusive breastfeeding

**Special Attention**

- Monitor and treat complications, such as anemia, preeclampsia, malpresentation, and bleeding
- Promote voluntary counseling and testing for HIV
- Reduce the risk of mother-to-child transmission (MTCT) of HIV

**WOMEN NEED SPECIAL ATTENTION DURING PREGNANCY AND CHILDBIRTH**

Surakha and her husband Vasant, from the Bodli village in Gadchiroli district, India, regret not attending antenatal checkups. Their son died at birth. Surakha wishes now she had taken the bus to the clinic 10 kilometers away. "If I'd gone for checkups we would have known the delivery could be difficult and gone to hospital," she says. But the fact is that when a pregnancy seems to be entirely normal, most rural women are reluctant to take time away from working in the fields. Four months after their son died, Surakha discovered that she was pregnant once again. This time Vasant has already accompanied his wife for an antenatal check at the hospital, and they plan to go again. Putting food on the table is only one thing a father can do. A man involved with the well-being of his children—even before the day they are born—is making a valuable investment in the future. INDIA



\*The complex issues of HIV and reproductive health are beyond the scope of this report. For more in-depth information, see the SARA Project publication: Prevention of mother-to-child transmission of HIV in Africa: practical guidance for programs. Washington, DC: AED, May 2001.

Decision-makers must also consider the social effects of new policies, such as isolation of or violence against women who are identified to be HIV positive, and the possibility of increased infant deaths caused by the high rate of infections often associated with the use of breast milk substitutes.

### CARE AT TIME OF BIRTH

#### Ensure skilled care at delivery

Historically, skilled care at delivery has been associated with lower neonatal death rates (Figure 4).<sup>55</sup> Skilled attendants at birth are defined as “people with midwifery skills (e.g., doctors, midwives and nurses) who have been trained to proficiency in the skills to manage normal deliveries, and diagnose and manage or refer complicated cases.”<sup>56</sup> Skilled care providers may practice in facility or household settings and require a functioning referral system for the manage-

ment of complications.

A primary barrier to delivering proper obstetric care in developing countries is that on average 63 percent of births occur in the home and only 53 percent of all births are attended by a health worker skilled in delivery care.<sup>57</sup> In other words, 53 million women each year give birth without the help of a professional.<sup>58</sup> In some countries the incidence of skilled care at deliveries is much lower; two percent in Somalia, for example, and nine percent in Nepal. Even in those cases where skilled health care is available, ongoing training and supervision of personnel and quality referral care for obstetric emergencies must be ensured.

Several randomized controlled trials have shown the value of a supportive companion in reducing the length of labor, producing fewer instrumental deliveries, and having a positive impact on Apgar scores (scores used to evaluate the condition of the newborn baby).<sup>59</sup> These

findings emphasize that the attitude of those attending the birth is an important factor along with the skill of the professional birth attendant, suggesting that personal support and skilled assistance in delivery are important to women in labor.

#### Provide for clean delivery

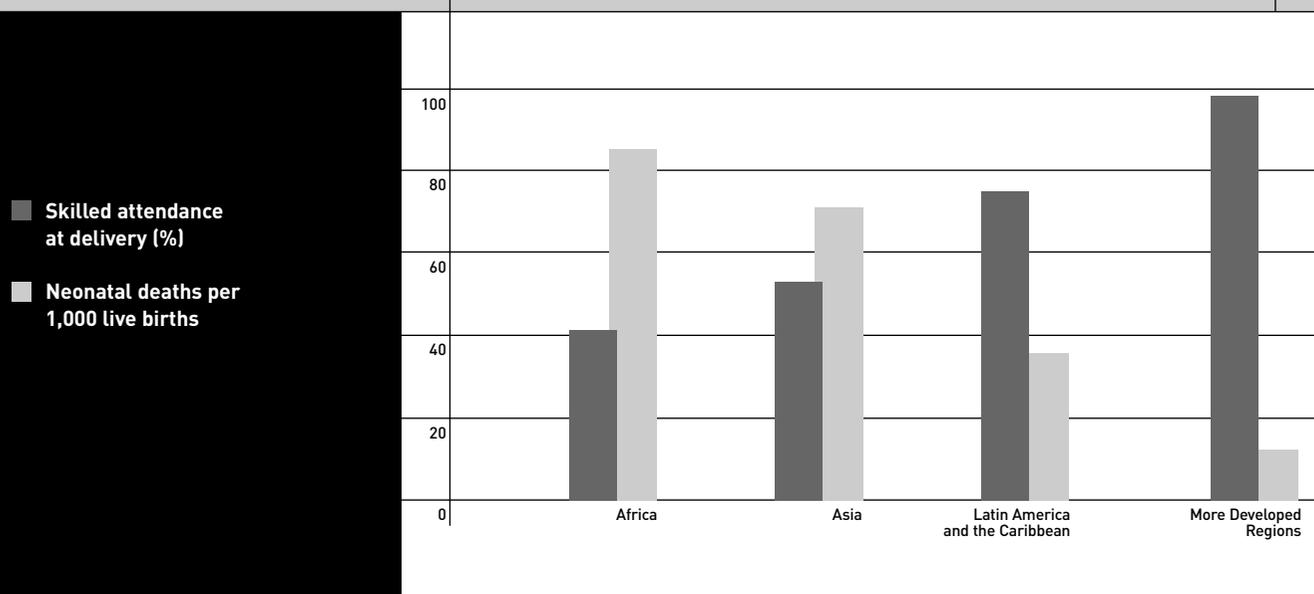
A clean delivery is crucial to prevent infection of the newborn and of the mother. The standard message is to maintain a “clean chain” by ensuring clean hands, clean surfaces, clean cord-cutting and tying, and a clean cloth to wrap the newborn.

The use of a clean delivery kit helps to promote cleanliness at birth. Most clean delivery kits include soap, a plastic sheet for delivery, a clean blade, and a cord tie.

#### Keep the newborn warm

A newborn baby regulates body temperature much less efficiently than does an adult and loses heat more easily, particularly from the

FIGURE 4 SKILLED CARE AT DELIVERY AND NEWBORN MORTALITY BY REGION



SOURCE WHO estimates 2001

## CARE AT TIME OF BIRTH

- Ensure skilled care at delivery
- Provide for clean delivery: clean hands, clean delivery surface, and clean cord care
- Keep the newborn warm: dry and wrap baby immediately, including covering the head; or put skin-to-skin with mother and cover
- Initiate immediate, exclusive breastfeeding, within one hour
- Give prophylactic eye care, as appropriate

### Special Attention

- Recognize danger signs/serious complications in both mother and baby and avoid delay in seeking care and referral
- Recognize and resuscitate asphyxiated babies immediately
- Pay special attention to warmth, feeding, and hygiene practices for preterm and LBW babies

head. A naked newborn, for example, exposed to an environmental temperature of 23°C (73.4°F) suffers the same heat loss as a naked adult at 0°C (32°F),<sup>60</sup> and the loss is greater still in LBW babies, especially if they are left wet and uncovered. Hypothermia in the newborn occurs in all climates and is due to a lack of knowledge or practice, not a lack of equipment.

Wherever the birth takes place, it is important to maintain a “warm chain” immediately after birth and during the following hours and days. The place where the birth occurs must be warm (at least 25°C/77°F) and free of drafts, though ventilated.

At birth, the newborn should be immediately dried and covered, including the head. While being dried, the baby should be placed on the mother’s chest or abdomen to

keep it warm. In some countries, the newborn baby is left uncovered until the placenta is delivered, a practice that considerably increases the risk of hypothermia. Skin-to-skin or close contact with the mother is the best way to keep the baby warm. Another advantage of continued close contact between newborn and mother is that it encourages breastfeeding on demand. Breastfeeding within one hour of delivery provides the baby with calories to produce body heat and of necessity keeps the baby close to the mother and warm. Bathing is generally not necessary on the first day and should be postponed until the baby is stable.

### Initiate exclusive breastfeeding

Immediate breastfeeding is one of the most effective interventions; it provides nutrients, warmth, and



### TRAINING FOR TRADITIONAL BIRTH ATTENDANTS

**A TBA who has assisted women during birth over four generations, recalls how in the old days she would pour thick warm gruel over a child immediately after delivery, cut the umbilical cord with a sickle, and check the newborn’s hearing by hitting a steel vessel with metal near her ear. Then she would massage the head into shape. These days, she washes her hands with soap and disinfectant before and after delivery, uses sterilized scissors to cut the cord, and cleans the mother and child with a clean cloth. She is also trained in resuscitation skills. INDIA**

#### ACCESS TO HEALTH CARE FACILITIES

**“I’d been in labor for six hours when the TBA said I should go to hospital because the baby was breech. Luckily a relative had a vehicle and as I arrived at the hospital the baby started to be born. Without this vehicle, who knows what would have happened.” MALAWI**

#### CLEAN DELIVERY KITS

**Seventeen-year-old Bimala was assisted in the birth of her son by her sister-in-law who is a trained birth attendant. “We used the clean delivery kit, which included a thread, a knife and a plastic sheet. Usually the baby isn’t wrapped up until the placenta comes out, but my sister-in-law told me to wrap him up straight away because it’s so cold up here in the hills.” NEPAL**

immunological protection for the baby; promotes bonding; and reduces postpartum hemorrhage. One of the most important services that can be provided to the mother is preparation for and support during breastfeeding. WHO recommends that newborn babies should be put to the breast within one hour after birth and should not go without breastfeeding for longer than three hours. In May 2001, the World Health Assembly adopted a resolution which set the optimal duration of exclusive breastfeeding at six months.<sup>61</sup>

#### **Give prophylactic eye care if appropriate**

Some newborns run the risk of becoming blind from gonorrhoea or chlamydia infections acquired from

the mother. Applying antibiotic ointment to the baby’s eyes within an hour of birth can prevent this.

#### **SPECIAL ATTENTION**

##### **Recognize danger signs and avoid delay in seeking care and referral**

It is crucial to identify maternal and newborn complications early and transport the mother and/or baby to an appropriate facility. There are four types of delay widely recognized as contributing to maternal and perinatal mortality:<sup>62</sup>

- delay in recognizing danger signs;
- delay in deciding to seek care;
- delay in getting care due to lack of transport or money; and
- delay in receiving quality, appropriate care after arriving at a health facility.

#### CARE AFTER BIRTH

- Ensure early postnatal contact
- Promote continued exclusive breastfeeding
- Maintain hygiene to prevent infection: ensure clean cord care and counsel mother on general hygiene practices, such as hand-washing
- Maintain warmth to prevent hypothermia
- Provide immunizations such as BCG, OPV, and hepatitis B vaccines, as appropriate
- Promote birth spacing

#### **Special Attention**

- Recognize danger signs/serious complications in both mother and newborn, particularly of infections, and avoid delay in seeking care and referral
- Support HIV positive mothers to make appropriate, sustainable choices about feeding
- Continue to pay special attention to warmth, feeding, and hygienic practices for LBW babies



**Recognize and resuscitate asphyxiated babies immediately**

In developing countries, there are an estimated four to nine million cases of birth asphyxia each year, resulting in almost 1.2 million neonatal deaths,<sup>63</sup> many of which could be prevented with prompt resuscitation.

There is evidence to suggest that the wider use of resuscitation techniques for asphyxiated babies, such as low-tech mouth-to-mouth resuscitation, is possible in developing country settings, even during home births. A study from Sweden found that almost 80 percent of newborns who needed to be resuscitated could be treated with no more than bag-and-mask intervention,<sup>64</sup> as opposed to requiring more complex interventions, such as intubation, chest compression, or drugs. Similarly, related research has also demonstrated that in most cases, newborns can be revived just as effectively with air as with oxygen,<sup>65</sup> a welcome finding for under-resourced district hospitals, health centers, and private homes where supplemental oxygen is not available. WHO has recently introduced a simple tube-and-mask method for use in primary care centers and in the home, but further studies are needed on its cost-effectiveness and utility during and adaptation for prolonged resuscitation efforts.

**Pay special attention to preterm and low birth weight babies**

There are a number of ways to help prevent death from preterm births (those occurring before 37 weeks of gestation). One is to detect and treat urinary and reproductive tract infections, which can lead to giving birth before term.

Another is to ensure that the birth takes place in a hospital that is equipped to deal with preterm births. Preterm babies have a better chance of surviving in such hospitals

because staff can diagnose the premature rupture of membranes and premature labor, and various drugs are more readily available, such as those which suppress labor and corticosteroids (drugs to mature the lungs of the unborn child and prevent respiratory distress in babies). When access to a hospital is not possible, simple measures such as keeping the baby warm, preventing infection by ensuring that caregivers frequently wash their hands, and frequent feeding (breast or expressed milk given by tube, spoon, or in a cup if the baby is unable to suck) may go a long way to reducing deaths among babies born before term.

Like preterm babies, LBW babies need special care, particularly with regard to warmth, feeding, hygiene practices, and promptly recognizing

the danger signs of infection.

One effective approach used in the care of both preterm and LBW babies is “kangaroo mother care,” which encourages breastfeeding and provides continuous warmth for the baby. Based on continuous skin-to-skin contact by laying the baby directly on the mother, the method can be effective, as long as the baby is stable and its signs are monitored carefully, and the baby can feed on demand.<sup>66</sup>

**CARE AFTER BIRTH**

The basic, low-cost principles of newborn care are still as relevant today as they were almost a century ago when the French obstetrician Pierre Budin spelled them out in his classic work, *The Nursling*.<sup>68</sup> All newborns require breathing, warmth, food, hygiene,

**BREASTFEEDING BEHAVIORS CAN BE CHANGED**

LINKAGES, a USAID-funded project, works with Ministries of Health, PVOs, NGOs and other partners to promote breastfeeding by encouraging individuals to carry out small “doable actions,” by enlisting the support of families and communities, and by building a critical mass of breastfeeding advocates at the national and regional levels to lay the groundwork for community programs.

Before LINKAGES, baseline data painted a bleak picture. In Madagascar, for example, one in two infants were given water, fluids, or other foods before the age of six months instead of only breastmilk. In Ghana, only 25 percent of women initiated breastfeeding within the first hour after birth, and only 31 percent exclusively breastfed their babies. In the Indian states of Bihar and Uttar Pradesh, most mothers delayed the start of breastfeeding for more than 24 hours, and many mothers introduced liquids too early and soft foods too late—feeding practices which lead to increases in infant morbidity and mortality.

With the right intervention, breastfeeding behaviors can change quickly and dramatically. Within six to nine months, the LINKAGES program doubled early initiation of breastfeeding in Madagascar (from 34 percent to 73 percent) and Ghana (from 25 percent to 50 percent). The program also increased the rates in Bolivia from 39 percent to 64 percent and in India from less than 1 percent to 22 percent (in the World Vision/LINKAGES project sites). Equally dramatic were the increases in exclusive breastfeeding, which went from 46 percent to 68 percent in Madagascar, from 31 percent to 68 percent in Ghana, and from 12 percent to 28 percent in CARE/LINKAGES project sites in India.<sup>67</sup>

**TABLE 3 SELECTED NEWBORN AND MATERNAL HEALTH SERVICE AND PRACTICE INDICATORS BY REGION, 1995-2000**

Region	Antenatal care (at least one visit) (%) 1995-99	Tetanus toxoid coverage in pregnant women (%) 1997-99	Skilled attendance at delivery (%) 1995-2000	Exclusive breastfeeding aged 0- 4 months (%) 1995-2000
SUB-SAHARAN AFRICA	65	42	37	34
MIDDLE EAST/NORTH AFRICA	65	55	69	42
SOUTH ASIA	51	69	29	46
EAST ASIA/PACIFIC	81	34	66	57
LATIN AMERICA/CARIBBEAN	84	51	83	37
CEE/CIS AND BALTIC STATES	-	-	94	-
INDUSTRIALIZED COUNTRIES	99	-	99	-
WORLD	69	51	56	44

Definitions of the indicators and sources of data are listed in the Explanatory Notes of Table II in the Appendix. A dash (" - ") indicates that an average could not be calculated for that region as more than 25% of countries had missing data.

#### **EFFORTS TO PREVENT MOTHER-TO-CHILD TRANSMISSION OF HIV IN MALAWI**

**On average 16 percent of pregnant women in Malawi who have been tested in the antenatal period are infected with HIV. Consequently, there is an urgent need to counsel women in relation to reproductive health and feeding practices. CHAPS (Community Health Partnerships) has designed a voluntary counseling and testing (VCT) program that will be available through the Baby-Friendly Hospital Initiative (BFHI). The government of Malawi has given the go-ahead to the drug Nevirapine which prevents replication of the virus causing infection in the mother's blood and breastmilk. At a cost of US\$4 per woman and requiring just two doses (one for the mother when she goes into labor and one for the baby 72 hours after birth), it has been shown to reduce the transmission rate by half. However, the cost-effective use of Nevirapine still depends on an effective VCT program, since only mothers known to be HIV positive will be given the drug. Unfortunately, most poor African women are out of reach of facilities that can provide testing and treatment. MALAWI**

love, and prompt treatment of illness.

#### **Ensure early postnatal contact**

Since so many deaths occur within the first hours or days after birth, early postnatal contact is key to newborn health and survival. This includes counseling on newborn care practices and recognizing, managing, and referring problems that need special attention. Appropriate follow-up must also be ensured.

#### **Promote continued exclusive breastfeeding**

A recent review has demonstrated the substantial benefits of exclusive breastfeeding over substitute feeding or partial breastfeeding, showing, among other things, that early and exclusive breastfeeding reduces neonatal mortality from infections.<sup>69,70</sup> But exclusive breastfeeding is still the exception rather than the rule in many countries. Over 80 percent of all newborn infants in South Asia, for example, are not put to the breast at

all in the first 24 hours, and colostrum (the "first milk" from the mother with potent immune defense properties) is widely discarded.<sup>71</sup> Rates for early breastfeeding are much lower in some countries, 10 percent or less, and rates for exclusive breastfeeding for the first three months are lower still (see Appendix, Table II for country-specific data).

Evidence clearly shows that the rates of early and continued exclusive breastfeeding can both be increased. In one study of home-based support for mothers in Mexico, exclusive breastfeeding increased among mothers who received counseling in the hospital and during follow-up home visits.<sup>72</sup> In a similar study of peer counselors in Bangladesh, early and extended breastfeeding increased after expectant and new mothers received counseling in the home.<sup>73</sup> Recent evidence from the LINKAGES Project in Ghana, Madagascar, and India has also shown that well-designed com-

munity-based behavior change interventions can produce dramatic increases in immediate and exclusive breastfeeding.<sup>74</sup> The UNICEF Baby-Friendly Hospital Initiative has also succeeded in increasing rates of breastfeeding in hospitals.

#### **Maintain hygiene to prevent infection**

Neonatal infections account for about one-third of neonatal deaths in developing countries. Early and exclusive breastfeeding, clean hands, and proper cord care are the basic principles for preventing infections, but they are still not practiced on a large scale.

#### **Provide Immunizations**

WHO recommends birth doses of BCG and oral polio vaccines (OPV). Hepatitis B vaccine should also be given where perinatal transmission of hepatitis B is frequent, as in South Asia.<sup>75</sup>

### **SPECIAL ATTENTION**

#### **Recognize danger signs and avoid delay in seeking care and referral**

Caregivers are in a position to observe danger signs in the newborn. Many of these danger signs are difficult to recognize, however, so caregivers need to be alert to a variety of abnormal infant behaviors and physical signs, such as changes in levels of activity or alertness, breathing and feeding difficulties, floppy limbs, convulsions, abnormal temperature, jaundice, pale skin, bleeding, vomiting, or a swollen abdomen.

#### **Support HIV positive mothers to make appropriate, sustainable choices about feeding**

In recent years, the advice of exclusive breastfeeding has come up against the reality of the risk of HIV transmission through breast milk. While the risk is real, so is the risk

associated with the alternative, mixed feeding. A study in developing countries with 25 percent prevalence of HIV estimates the risk of transmission of HIV through breastfeeding at less than four percent.<sup>76</sup> A study in Durban, South Africa, meanwhile, suggests that exclusive breastfeeding has a reduced risk of transmission compared with mixed feeding, i.e., breastfeeding supplemented with breast milk substitutes.<sup>77</sup>

The best approach in these areas is to provide voluntary counseling and testing (VCT) where possible. Only when replacement feeding is safe, acceptable, feasible, affordable, and sustainable should alternatives to breastfeeding by HIV-infected mothers be recommended. Otherwise, exclusive breastfeeding should be considered during the first six months of life.

#### **LBW babies**

LBW and preterm babies continue to

require special attention during the postnatal period as described on p. 33.

### **MONITORING PROGRESS IN NEWBORN HEALTH**

A number of health status and process indicators have been proposed for monitoring progress in improving newborn health and survival. Commonly used indicators include neonatal mortality rate, antenatal care coverage, the percentage of all births attended by skilled health workers, tetanus toxoid vaccination coverage, and the proportion of mothers who exclusively breastfeed their babies (see Table 3; for country-specific data, see Appendix, Table II). However, information on postnatal care is rarely collected. Measuring the proportion of mothers and newborns who have early postnatal contact will go a long way to help ensure that healthy practices are promoted and complications recognized and addressed.





THE WAY FORWARD:  
SAVING NEWBORN  
LIVES



The plight of the world's newborns is real; the case for addressing it is strong; and the solutions are within our grasp. All that is needed is to mobilize the will and the resources to put the necessary interventions into practice.

### **THE WAY FORWARD: SAVING NEWBORN LIVES**

The plight of the world's newborns is real; the case for addressing it is strong; and the solutions are within our grasp. In recent years, childhood deaths have been reduced through major public health interventions; now it's time to focus on expectant mothers and their newborns. A healthy start in life leads to healthier and more productive children and adults. It is key to meeting the global development goal, agreed upon by the international development community, to reduce by two-thirds the death rates of infants and children under the age of five years in developing countries. Because neonatal death rates have been stagnant and newborn deaths now account for two-thirds of infant deaths, substan-

tial progress towards this goal will clearly depend on improving newborn health.

Change is possible. In closing, we offer several recommendations to help guide international and national strategies for improving newborn survival and well-being.

**Increase commitment to newborn health.** Improving newborn health is equally a matter of practice and policy, and in most cases the latter must be in place to drive the former. If newborn care programs are to receive the support they need—the kind of support currently available for reproductive health, child health, and communicable disease prevention, for example—they will need to receive more commitment and resources and to figure more promi-

nently in national health plans and health reform programs. To create a favorable policy environment conducive to and supportive of newborn health, advocacy will be needed at professional, local, national, and international levels.

To translate policy into practice, a commitment must be made to provide adequate financial resources as well as to increase the quantity and quality of staff with relevant skills. In addition to the need for incremental national budget allocations, the international donor and NGO community should be encouraged to support efforts to take to scale both established and innovative interventions proven to be cost-effective on a small scale.



### **TRAINING AND PLACING VILLAGE MIDWIVES**

In 1993, Indonesia embarked on an ambitious village midwife program, *Bidan di Desa (BDD)*, that trained and placed more than 54,000 midwives with the aim of making family planning and maternity care accessible to all women. These village midwives complete a four-year training program, which includes three years of nursing school plus one year of a midwifery program. They are expected to have midwifery skills for managing normal pregnancies and deliveries; identifying, stabilizing and referring complications; and providing basic care of newborns. Given that so many women remain at home for labor and delivery, the village midwives are encouraged to visit them in the home throughout the pregnancy and postpartum time and to attend home deliveries.

Village midwives are hired on three-year renewable contracts in almost every village in the country. They are frequently the only source of maternal, child, and basic health care. Between 1994 and 1997, the proportion of births attended by a village midwife increased from 34 percent to 40 percent nationally and to almost 65 percent in parts of Java and Bali. Moreover, 80 percent of women now consider village midwives to be an appropriate source of family planning information. This demonstrates a rising level of acceptance of the village midwife as a provider of reproductive health services.<sup>78,79</sup> INDONESIA

**Begin care for newborns with care for mothers.** A newborn's chance of survival and well-being begins well before birth, with the health and nutritional status of the mother and preparation for a safe delivery. A continuum of care, beginning before birth, should include antenatal care and safe delivery, followed by health visits for both mother and baby to ensure good newborn care practices, and the identification and appropriate management of complications. A healthy start requires nutritional support to pregnant women, treatment of infections such as malaria and syphilis, birth preparedness, skilled care at delivery, recognition of danger signs, and prompt treatment of obstetric complications.

Programs also need to address the cultural, social, and economic barriers that may inhibit women's access to information and services, emphasizing community and home-based approaches and the involvement of husbands and other family decision-makers. Improving education and employment opportunities will have the greatest long-term impact on the status of women.

**Integrate newborn care into existing safe motherhood, child survival, and other programs.** Newborn care efforts do not have to be started from scratch. Rather than being initiated independently, interventions to improve newborn health (before, during, and after birth) should be folded into already established programs, and can be linked particularly effectively with safe motherhood and child survival. Those interventions with demonstrated effectiveness include tetanus toxoid immunization, skilled care at delivery, breastfeeding support, hygienic practices, and thermal control.

Most countries also have a variety of other programs that could easily accommodate an added emphasis

on health care for newborns. Programs that encourage improved maternal nutrition, screen for sexually transmitted infections (STIs), expand immunization coverage, provide family planning services, or promote improved reproductive health are all candidates for the integration of a newborn health component.

For the most part, this integration does not have to be complicated. An early postnatal visit can be added to safe motherhood programs to benefit both the new mother and her baby; child health programs can begin to address the newborn as well as the older child; STI and malaria control programs can do a better job of reaching expectant mothers; and family planning services offer a natural platform for encouraging adolescent women to delay childbearing and new mothers to space their pregnancies at least two years apart.

**Develop and replicate promising program innovations.** In addition to strengthening and expanding the newborn component of existing programs, promising new programs to improve newborn health and survival need to be further refined, tested, and replicated. The program innovation may be a new cadre of health worker, an approach (such as the positive deviance method used by SC in Vietnam), a new technology, or a new model of collaboration. Meanwhile, existing projects in newborn health should be closely evaluated and replicated where appropriate. Innovative and cost-effective projects—such as the SEARCH project in India, the Warmi project in Bolivia, or the Bidan di Desa (Village Midwife) project in Indonesia—have shown such promising initial results that they should be tested, adapted, and evaluated further. Indeed, Save the Children's Saving Newborn Lives initiative is



#### SAVE THE CHILDREN'S WARMI PROJECT

**The objective of the Warmi Project is to improve maternal and newborn health in rural areas of Bolivia with limited access to modern medical facilities. During the demonstration phase (1990–1993), the program focused on initiating and strengthening women's organizations, developing women's skills in identifying problems, and training community members in safe birthing techniques. As a result of the intervention, perinatal mortality decreased from 117 deaths per 1,000 births before the intervention to 44 deaths per 1,000 births after. There was a significant increase in the number of women participating in women's organizations following the intervention, as well as in the number of functioning women's organizations. The proportion of women receiving prenatal care and initiating breastfeeding on the first day after birth also increased significantly. The study demonstrated that community organization can improve maternal and child health in remote areas.<sup>80</sup> BOLIVIA**

## A MODEL OF NEONATAL CARE IN THE GADCHIROLI DISTRICT IN INDIA

In the Gadchiroli district of India, about 1,000 kilometers from the state capital, Mumbai, a remarkable model of home-based neonatal care has managed to significantly reduce neonatal and infant mortality among malnourished, illiterate, rural villagers in the SEARCH project area.

Recognizing that hospital-based care for sick newborns was not possible in their community, Drs Rani and Abhay Bang and colleagues at SEARCH (Society for Education, Action & Research in Community Health) conceived the innovative idea of a home-based newborn health care program. It had to be home-based, they concluded, because 83 percent of births in rural India occur at home; more than 90 percent of parents are unwilling to go to hospital for treatment of a sick newborn; local doctors are not trained to manage sick neonates; and hospital care is inaccessible and costly.

The SEARCH study collected baseline data for two years (1993–1995) from 39 intervention villages and 47 control villages. SEARCH then introduced neonatal care in the intervention villages (1995–1998) and monitored mortality rates in both the control and intervention villages.

The key promoters of neonatal health in this program are village health workers (VHWs) and TBAs. The VHWs visit each woman three times during her pregnancy, provide health education, and look after the neonate during the first month of life. They are trained to resuscitate asphyxiated babies, support breastfeeding and maintenance of body temperature, and to recognize and treat sepsis. They also provide hand-made portable incubators (a cloth bag insulated with foam) for LBW babies.

TBAs receive training and are supplied with clean delivery kits as well as iron, folic acid and calcium tablets, ointment for neonatal conjunctivitis, antiseptic ointment for cracked nipples, cotrimoxazole syrup for pneumonia, paracetamol tablets, vitamin A capsules for night blindness, and glycerin for mouth infections. They also provide condoms.

By the third year, 93 percent of newborns in the intervention areas were receiving home-based care. SEARCH was able to record 98 percent of births and child deaths in the area. While the NMR in the control area remained at around 50 to 65 per 1,000 over the course of the study, in the action area it dropped to 25 per 1,000 by the third year of intervention, a 62 percent reduction compared to the baseline period. The infant mortality rate was also nearly cut in half. About 75 percent of the reduction in NMR was attributed to fewer deaths with signs of infection. This package of care also significantly reduced the incidence of various neonatal morbidities as well as maternal morbidities, thus establishing the feasibility of combining postpartum care of the mother with neonatal care.

The package costs an estimated US\$5.30 per newborn, and one death was avoided for every 18 babies who received care. The cost per life saved was an estimated US\$95.40, which is less than the cost per life saved with measles vaccination. Abhay and Rani Bang hope that SEARCH will provide a creative initiative for similar organizations throughout the developing world.

Save the Children, through the Saving Newborn Lives initiative, is testing the impact of this approach in other settings, and is evaluating the sustainability of this strategy in a larger setting through the expansion of SEARCH's program to seven additional sites throughout Maharashtra state.<sup>81</sup> INDIA

already engaged in expanding the SEARCH project to seven different sites in India.

### Monitor and evaluate what we do.

Policymakers and program planners need good data in order to better understand how to use existing resources, monitor program performance, and make necessary changes in health care programs. It is critical to develop, validate, and use better process and outcome

indicators to carefully monitor and document progress in newborn health and services. To this end, program managers and researchers will need to shift their focus from hospitals to the community, where most babies die.

### Enhance our knowledge base.

While information on the status of the newborn is increasingly available, less is known about how to prevent the causes of newborn

death. Three types of research would be particularly helpful in addressing this need:

- **Formative research** to better understand current local beliefs and practices, and the reasons for these, so that effective behavior change strategies can be developed;
- **Operations research** to better understand how to deliver affordable, life-saving preventive and curative care; and
- **Epidemiological research** to pin-

point contributing factors to newborn deaths.

It is time to move from efficacy trials of single interventions to effectiveness trials with communities. Furthermore, interventions must be evaluated quickly so sustainable packages of care can be scaled up without delay, even in the most remote and impoverished areas. Finally, communications among researchers, program managers, and policymakers must be established at the outset of each research project to make sure study results are translated into effective programs.

**Keep the focus on the home and the community.** At the present time and for the foreseeable future in developing countries, the vast majority of births—and therefore of newborn deaths—will take place in the home. Accordingly, effective newborn care efforts must focus on this crucial setting and what transpires there.

Thus, programs must target birth attendants and other community health workers, whether it is to provide training, strengthen supervision and referral linkages, or provide supplies such as clean home delivery kits. Enhancing the capacity of these caregivers will help to ensure proper counseling of women and their families, a clean, well-managed delivery (or timely referral where necessary), and effective postnatal care for mother and child—the cornerstones of a successful newborn health program.

Programs must also target families with maternal and newborn health messages through non-health channels, such as community organizations and the media. The ultimate goal, of course, is changing behavior, of mothers and all family members, from practices which put mothers and newborns at risk to those which enhance their health and well-being.

### THE CHALLENGE AHEAD

The familiar call to “think globally and act locally” is as relevant to saving newborn lives as it is to other development efforts. The challenge is to transfer knowledge and funds from “high places” of learning and policy-making to the home and community. Donors and international agencies need to coordinate their activities and form partnerships to provide leadership at all levels and help lay the foundation of efforts to save newborns.

We have a great deal of knowledge about effective neonatal care and low-cost approaches such as tetanus toxoid immunization, skilled care at delivery, breastfeeding, and thermal control that can save many newborn lives. One challenge, therefore, is simply improving what we already do and applying what we already know. Another challenge is to identify cost-effective interventions to address newborn problems currently lacking ready solutions, such as managing asphyxia at the community level.

Saving newborn lives requires a paradigm shift. We need to change our focus to the time when most infants die—the first 28 days of life. We need to shift the focus of our research from hospitals to the community, where most babies die. We need to concentrate our efforts on those who are best placed to make the greatest contribution: family caregivers and those working at the community level. And we need to move quickly to ensure that proven, effective interventions are implemented on the widest possible scale.

Communities in developing countries will discover that ensuring a healthy beginning for every newborn will make a significant return on the investment, as each child has an opportunity to survive and thrive from the moment of birth.



### QUALITATIVE RESEARCH CAN PROVIDE VALUABLE INSIGHTS

**MIRA (Mother and Infant Research Activities), a community-based project in the Makwanpur district of Nepal, spent nearly one year collecting ethnographic information during the first phase of the program. The facilitation team explored the issues around childbirth in the communities in which they were to initiate the intervention. This exploration served as a prolonged induction and training period for the facilitators, and generated a body of ethnographic information on pregnancy and childbirth. This included an understanding of how decisions are made within households, the role of mothers-in-law, pollution rituals, and spiritual beliefs about pregnancy-related problems. The group also discovered that most babies were being given cold baths within three hours of birth, exposing them to the risk of hypothermia. This understanding provides a starting point for the facilitators to discuss alternatives with community groups.<sup>82</sup> NEPAL**

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## ABBREVIATIONS

<b>AIDS</b> Acquired Immunodeficiency Syndrome	<b>IMCH</b> Integrated Maternal and Child Health	<b>STI</b> Sexually transmitted infection
<b>ANC</b> Antenatal care	<b>IMR</b> Infant mortality rate	<b>TBA</b> Traditional birth attendant
<b>BCC</b> Behavior change communications	<b>IUGR</b> Intra-uterine growth retardation	<b>TFR</b> Total fertility rate
<b>BFHI</b> Baby-Friendly Hospital Initiative	<b>LBW</b> Low birth weight	<b>TT</b> Tetanus toxoid
<b>CDC</b> Centers for Disease Control and Prevention	<b>MIRA</b> Mother and Infant Research Activities, Nepal	<b>UN</b> United Nations
<b>CEE</b> Central and Eastern Europe	<b>MMR</b> Maternal mortality rate	<b>UNDP</b> United Nations Development Programme
<b>CHAPS</b> Community Health Partnerships, Malawi	<b>MTCT</b> Mother-to-child transmission	<b>UNFPA</b> United Nations Population Fund
<b>CIS</b> Commonwealth of Independent States	<b>NGO</b> Nongovernmental organization	<b>UNICEF</b> United Nations International Children's Fund
<b>DHS</b> Demographic and Health Surveys	<b>NMR</b> Neonatal mortality rate	<b>USAID</b> United States Agency for International Development
<b>HDI</b> Human development index	<b>OPV</b> Oral Polio Vaccine	<b>VCT</b> Voluntary counseling and testing program
<b>HIV</b> Human Immunodeficiency Virus	<b>SEARCH</b> Society for Education, Action and Research in Community Health	<b>VHW</b> Village health worker
	<b>SNL</b> Saving Newborn Lives	<b>WHO</b> World Health Organization

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## STATISTICAL OVERVIEW OF NEWBORN HEALTH

This statistical overview reveals great variation in the health status of newborns around the world and in the services, practices and policies that affect their survival. Our hope is that these statistics, despite their limitations, will provide a tool to improve the health of tomorrow's newborns, and hence the future for all.

### WHAT THE TABLES WILL AND WILL NOT TELL YOU

These tables provide information for 163 countries regarding 12 indicators relevant to newborn health and survival. The countries in these tables represent over 99 percent of the world's births. Most of the countries not included have less than 10,000 births per year.

Every attempt has been made to obtain the most recent and the best quality data available and, wherever possible, nationally reported data or population-based survey data have been used. But the information in these tables also comes from a wide variety of other sources, and the quality varies accordingly. In general, data quality is likely to be worse for countries that have suffered recent disruptions in infrastructure, due to war or natural disasters. Neonatal mortality data were especially difficult to access, and are likely to be underestimated, as discussed under the notes for this indicator. We have not adjusted the figures here despite expected inaccuracies, but have used data from national or international agencies and population-based sur-

veys, and stated the likely sources of error and the limitations for each indicator. WHO has produced estimates for neonatal mortality, which are adjusted to allow for underestimation (Table 1, p.14). Partly because focus on newborn health is a recent phenomenon, information is lacking for many of the indicators that we would like to have included, especially late fetal deaths and postpartum/newborn care.

### Explanation of the tables

The indicators are described in detail in the explanatory notes on page 45, which include a definition, justification for use, details of sources, and comments on the quality of the data. Data that were collected outside the time period specified in the column heading are marked with "x." If data were not available, the cell is marked "-."

Using a country's name in these tables does not imply recognition of any country or territory on the part of the compilers.

**Table I** Newborn Health Status includes the following indicators:

- Ranking by Human Development Index;
- Neonatal mortality rate;
- Estimated number of births annually;
- Calculated number of neonatal deaths annually;
- Percent of babies born with LBW;
- Estimated number of LBW babies per year; and
- Estimates of maternal death.

**Table II** Newborn Health Services and Practices includes the following indicators:

- Antenatal care contact;
- Tetanus toxoid immunization (2 vaccinations) coverage in pregnant women;
- Skilled attendant at delivery;
- Early breastfeeding; and
- Exclusive breastfeeding 0-4 months (based on 24 hour recall).

**TABLE I  
NEWBORN  
HEALTH STATUS**

Country	Human Development Index rank	Neonatal mortality rate per 1,000 live births 1995-2000	Estimated births per year in thousands 1999	Estimated number of neonatal deaths per year calculated	Percent of babies born with low birth weight 1995-99	Estimated number of low birth weight babies per year	Estimated number of maternal deaths per 100,000 live births 1995
AFGHANISTAN	-	-	1,139	-	20	227,800	819
ALBANIA	94	5	62	310	7	4,340	31
ALGERIA	107	22 <sup>x</sup>	881	19,382	9	79,290	148
ANGOLA	160	-	595	-	19	113,050	1,308
ARGENTINA	35	12	718	8,630	7	50,260	84
ARMENIA	93	20	46	920	9	4,140	29
AUSTRALIA	4	4	245	950	6	14,700	6
AUSTRIA	16	3	81	260	6	4,860	11
AZERBAIJAN	90	-	121	-	6	7,260	37
BAHRAIN	41	-	11	-	6	660	38
BANGLADESH	146	48	3,504	169,590	30	1,051,200	596
BELARUS	57	9	99	890	-	-	33
BELGIUM	7	4	105	420	6	6,300	8
BENIN	157	38	242	9,240	8	19,360	884
BHUTAN	142	-	76	-	-	-	502
BOLIVIA	114	34	264	8,920	5	13,200	550
BOSNIA AND HERZEGOVINA	-	9	39	350	3	1,170	15
BOTSWANA	122	22 <sup>x</sup>	53	1,190	11	5,830	1,379
BRAZIL	74	19	3,344	63,540	8	267,520	262
BULGARIA	60	8	71	537	6	4,260	23
BURKINA FASO	172	41	530	21,620	21	111,300	1,379
BURUNDI	170	35 <sup>x</sup>	273	9,610	-	-	1,881
CAMBODIA	136	45 <sup>a</sup>	360	16,200	18	64,800	590
CAMEROON	134	37	573	21,320	13	74,490	720
CANADA	1	4	343	1,360	6	20,580	6
CAPE VERDE	105	-	13	-	9	1,170	188
CENTRAL AFRICAN REPUBLIC	166	42	132	5,560	15	19,800	1,205
CHAD	167	44	323	14,180	-	-	1,497
CHILE	38	5 <sup>a</sup>	290	1,450	5	14,500	33
CHINA	99	23 <sup>x</sup>	19,821	455,883	6	1,189,260	62
COLOMBIA	68	19	988	18,475	9	89,820	119
COMOROS	137	38	24	920	8	1,920	573
CONGO	139	-	123	-	16	19,680	1,108
CONGO, DEM. REP. OF THE	152	-	2,293	-	15	343,950	939
COSTA RICA	48	8	90	680	7	6,300	35
CÔTE D'IVOIRE	154	42	540	22,680	12	64,800	1,188
CROATIA	49	7	47	320	5	2,350	18
CUBA	56	5	141	710	7	9,870	24
CZECH REPUBLIC	34	3	88	290	6	5,280	14
DENMARK	15	4	63	260	6	3,780	15
DJIBOUTI	149	-	23	-	11	2,530	520
DOMINICAN REPUBLIC	87	27	195	5,190	13	25,350	110
ECUADOR	91	19	309	5,870	13	40,170	207
EGYPT	119	30	1,720	52,290	10	172,000	174
EL SALVADOR	104	23	167	3,840	13	21,710	183
EQUATORIAL GUINEA	131	-	18	-	-	-	1,404
ERITREA	159	25	148	3,670	13	19,240	1,131
ESTONIA	46	6	12	70	-	-	78
ETHIOPIA	171	49	2,699	131,440	16	431,840	1,841
FIJI	66	-	17	-	12	2,040	20
FINLAND	11	3	57	170	4	2,280	6
FRANCE	12	3	711	2,210	5	35,550	20
GABON	123	30	44	-	8	3,520	617
GAMBIA	161	40 <sup>b</sup>	50	2,000	14	7,000	1,071
GEORGIA	70	23	69	1,580	5	3,450	22

**KEY**

<sup>x</sup> Indicates that the data were collected outside the time period specified in the column heading.

- Indicates that the data were not available.

<sup>a</sup> WHO estimates made in 2001 based on the best available data.

<sup>b</sup> Ceesay SM et al. *BMJ* 1997; 315: 786-790.

<sup>c</sup> Ibrahim MM et al. *Bull WHO*, 1996; 74(S): 547-552.

<sup>d</sup> R Pattinson. Unpublished data based on 27 hospital-based sentinel sites during 2000.

Country	Human Development Index rank	Neonatal mortality rate per 1,000 live births 1995-2000	Estimated births per year in thousands 1999	Estimated number of neonatal deaths per year calculated	Percent of babies born with low birth weight 1995-99	Estimated number of low birth weight babies per year	Estimated number of maternal deaths per 100,000 live births 1995
GERMANY	14	3	736	2,350	5	36,800	12
GHANA	129	30	724	21,500	8	57,920	586
GREECE	25	5	97	500	6	5,820	2
GUATEMALA	120	23	399	9,290	15	59,850	267
GUINEA	162	48	312	15,100	13	40,560	1,224
GUINEA BISSAU	169	-	49	-	20	9,800	914
GUYANA	96	-	18	-	15	2,700	151
HAITI	150	31	255	7,960	15	38,250	1,122
HONDURAS	113	20	205	4,100	9	18,450	221
HUNGARY	43	6	96	610	9	8,640	23
ICELAND	5	5	4	20	4	160	-
INDIA	128	43	24,489	1,053,027	33	8,081,370	437
INDONESIA	109	22	4,608	100,450	8	368,640	472
IRAN, ISLAMIC REP. OF	97	30 <sup>a</sup>	1,392	41,760	10	139,200	130
IRAQ	126	30 <sup>a</sup>	804	24,120	15	120,600	367
IRELAND	18	4	53	210	4	2,120	9
ISRAEL	23	4	118	500	7	1,260	8
ITALY	19	5	506	2,410	5	25,300	11
JAMAICA	83	8	54	440	11	5,940	115
JAPAN	9	2	1,271	2,310	7	88,970	12
JORDAN	92	19	223	4,240	10	22,300	41
KAZAKHSTAN	73	20	292	5,690	9	26,280	78
KENYA	138	28	992	28,170	16	158,720	1,339
KOREA, DEM. PEOPLE'S REP.	-	-	472	-	4	18,880	35
KOREA REP.	31	5 <sup>a</sup>	681	3,405	9	61,290	20
KUWAIT	36	-	40	-	7	2,800	25
KYRGYZSTAN	98	32	116	3,670	6	6,960	79
LAO PEOPLE' DEM. REP.	140	-	205	-	18	36,900	653
LATVIA	63	8	20	160	-	-	68
LEBANON	82	20	73	1,460	10	7,300	127
LESOTHO	127	-	73	-	11	8,030	529
LIBERIA	-	68 <sup>x</sup>	129	8,760	-	-	1,016
LIBYAN ARAB JAMAHIRIYA	72	17	160	2,720	7	11,200	117
LITHUANIA	52	6	36	225	4	1,440	27
LUXEMBOURG	17	2	5	0	6	300	0
MACEDONIA, TFYR	69	10	31	322	-	-	17
MADAGASCAR	141	40	604	24,400	5	30,200	583
MALAWI	163	41 <sup>x</sup>	497	20,480	20	99,400	576
MALAYSIA	61	12	520	6,340	9	46,800	39
MALDIVES	89	-	10	-	13	1,300	385
MALI	165	60	507	30,620	16	81,120	630
MALTA	27	5	5	20	4	200	0
MAURITANIA	147	41 <sup>x</sup>	104	4,260	11	11,440	874
MAURITIUS	71	17	18	310	13	2,320	45
MEXICO	55	25	2,324	58,100	7	162,680	67
MOLDOVA, REP.	102	9	56	530	5	2,240	63
MONGOLIA	117	-	58	-	7	4,060	63
MOROCCO	124	20	703	14,060	9	63,270	390
MOZAMBIQUE	168	54	826	44,520	12	99,120	975
MYANMAR	125	-	942	-	24	226,080	165
NAMIBIA	115	32	60	1,890	16	9,600	368
NEPAL	144	50	820	40,920	27	221,400	826
NETHERLANDS	8	3	176	530	5	8,800	10
NEW ZEALAND	20	4	57	220	6	3,420	15
NICARAGUA	116	17	174	2,980	9	15,660	246

Country	Human Development Index rank	Neonatal mortality rate per 1,000 live births 1995-2000	Estimated births per year in thousands 1999	Estimated number of neonatal deaths per year calculated	Percent of babies born with low birth weight 1995-99	Estimated number of low birth weight babies per year	Estimated number of maternal deaths per 100,000 live births 1995
NIGER	173	44	497	21,970	15	74,550	923
NIGERIA	151	37	4,176	154,512	16	668,160	1,129
NORWAY	2	3	57	164	4	2,280	9
OMAN	86	-	87	-	8	6,960	115
PAKISTAN	135	49 <sup>x</sup>	5,349	261,566	25	1,337,250	201
PANAMA	59	-	61	-	10	6,100	98
PAPUA NEW GUINEA	133	-	149	-	23	34,270	387
PARAGUAY	81	20	165	3,300	5	8,250	172
PERU	80	24	610	14,640	11	67,100	235
PHILIPPINES	77	18	2,064	36,739	9	185,760	238
POLAND	44	9	417	3,808	8.6	35,862	12
PORTUGAL	28	4	102	421	5	5,100	12
QATAR	42	-	11	-	5	550	41
ROMANIA	64	18	201	3,698	7	14,070	62
RUSSIAN FEDERATION	62	9	1,434	12,330	7	100,380	74
RWANDA	164	39 <sup>x</sup>	295	11,387	17	50,150	2,318
SAUDI ARABIA	75	10 <sup>a</sup>	696	6,960	7	48,720	23
SENEGAL	155	37	364	13,614	4	14,560	1,198
SIERRA LEONE	174	-	214	-	11	23,540	2,065
SINGAPORE	24	26	49	1,274	7	3,430	9
SLOVAKIA	40	-	56	-	-	-	14
SLOVENIA	29	4	18	69	6	1,080	17
SOLOMON ISLANDS	121	-	15	-	20	3,000	59
SOMALIA	-	48 <sup>c</sup>	500	24,000	16	80,000	1,582
SOUTH AFRICA	103	11 <sup>d</sup>	1,055	11,605	14 <sup>d</sup>	147,700	341
SPAIN	21	4	358	1,285	4	14,320	8
SRI LANKA	84	20	328	6,560	25	82,000	62
SUDAN	143	44 <sup>x</sup>	944	41,347	15	141,600	1,452
SWAZILAND	112	-	37	-	10	3,700	374
SWEDEN	6	3	86	260	5	4,300	8
SWITZERLAND	13	3	79	240	5	3,950	8
SYRIAN ARAB REPUBLIC	111	18	472	8,490	7	33,040	195
TAJIKISTAN	110	-	189	-	6.5	12,285	123
TANZANIA, REP	156	40	1,332	53,280	14	186,480	1,059
THAILAND	76	20	997	20,140	6	59,820	44
TOGO	145	41	185	7,640	20	37,000	983
TRINIDAD AND TOBAGO	50	10	18	180	10	1,800	67
TUNISIA	101	30	190	5,700	8	15,200	69
TURKEY	85	26	1,415	36,510	8	113,200	56
TURKMENISTAN	100	-	121	-	5	6,050	63
UGANDA	158	27	1,081	29,190	13	140,530	1,056
UKRAINE	78	10	482	4,630	5	24,100	45
UNITED ARAB EMIRATES	45	-	44	-	6	2,640	30
UNITED KINGDOM	10	4	680	2,810	7	47,600	10
UNITED STATES	3	5	3,754	18,520	7	262,780	12
URUGUAY	39	-	58	-	8	4,640	51
UZBEKISTAN	106	23	653	14,890	6	39,130	59
VENEZUELA	65	10 <sup>a</sup>	574	5,740	9	51,660	43
VIET NAM	108	18	1,654	30,430	17	281,180	96
YEMEN	148	34	821	27,590	19	155,990	850
YUGOSLAVIA	-	15 <sup>a</sup>	136	2,040	6.4	8,704	15
ZAMBIA	153	36	377	13,350	13	49,010	867
ZIMBABWE	130	29	354	10,270	10	35,400	609

**TABLE II  
NEWBORN HEALTH  
SERVICES**

Country	Human Development Index rank	Percent of pregnant women with at least one antenatal visit 1995-99	Percent of pregnant women with at least two tetanus toxoid immunizations 1997-99	Percent of births attended by skilled personnel 1995-2000	Percent of babies breastfed in the first hour of life 1995-99	Percent of babies aged 0-4 months exclusively breastfed (24 hour recall) 1995-99
AFGHANISTAN	-	8	19	8	-	25
ALBANIA	94	58	77	99	-	9
ALGERIA	107	-	52	77	22	48
ANGOLA	160	52	16	17	-	12
ARGENTINA	35	95	-	98	-	-
ARMENIA	93	82	36	97	-	21
AUSTRALIA	4	100	-	100	-	-
AUSTRIA	16	100	-	100	-	-
AZERBAIJAN	90	98	-	100	-	26
BAHRAIN	41	96	80	98	40	36
BANGLADESH	146	33	85	13	13	53
BELARUS	57	-	-	100	-	-
BELGIUM	7	-	-	100	-	-
BENIN	157	80	90	60	24	15
BHUTAN	142	51	73	15	-	-
BOLIVIA	114	69	27	59	39	61
BOSNIA AND HERZEGOVINA	-	99	-	97	-	8
BOTSWANA	122	92	56	87	-	39
BRAZIL	74	82	30	92	32	42
BULGARIA	60	-	-	100	-	-
BURKINA FASO	172	61	30	27	30	5
BURUNDI	170	88	9	24	-	89
CAMBODIA	136	34	33	34	-	16
CAMEROON	134	78	44	55	38	16
CANADA	1	100	-	100	-	-
CAPE VERDE	105	99	52	54	-	57
CENTRAL AFRICAN REP	166	67	25	46	34	23
CHAD	167	23	27	15	24	2
CHILE	38	98	-	100	-	74
CHINA	99	79	13	67	-	64
COLOMBIA	68	91	57	85	49	16
COMOROS	137	84	22	52	25	5
CONGO	139	55	33	50	-	43
CONGO, DEM.REP.	152	66	-	-	-	32
COSTA RICA	48	95	-	98	-	35
CÔTE D'IVOIRE	154	83	44	47	44	4
CROATIA	49	-	-	100	-	24
CUBA	56	100	70	100	-	76
CZECH REPUBLIC	34	100	-	99	-	-
DENMARK	15	100	-	100	-	-
DJIBOUTI	149	76	14	79	-	-
DOMINICAN REP	87	98	86	99	63	25
ECUADOR	91	75	34	71	38	29
EGYPT	119	53	66	61	41	60
EL SALVADOR	104	69	70	90	15	21
EQUATORIAL GUINEA	131	37	70	5	-	-
ERITREA	159	49	28	21	48	66
ESTONIA	46	98	-	95	-	-
ETHIOPIA	171	26	35	10	-	84
FIJI	66	100	-	-	-	-
FINLAND	11	100	-	100	77	26
FRANCE	12	99	83	99	-	-
GABON	123	86	25	80	-	32
GAMBIA	161	86	96	44	-	35
GEORGIA	70	95	-	96	-	18

**KEY**

- Indicates that the data were not available.

† The US data regarding exclusive breastfeeding are based on babies exclusively breastfed from birth using NSFG survey data.

Country	Human Development Index rank	Percent of pregnant women with at least one antenatal visit 1995-99	Percent of pregnant women with at least two tetanus toxoid immunizations 1997-99	Percent of births attended by skilled personnel 1995-2000	Percent of babies breastfed in the first hour of life 1995-99	Percent of babies aged 0-4 months exclusively breastfed (24 hour recall) 1995-99
GERMANY	14	99	80	100	-	33
GHANA	129	88	52	44	16	36
GREECE	25	-	-	99	-	-
GUATEMALA	120	53	38	41	55	47
GUINEA	162	71	48	35	26	13
GUINEA BISSAU	169	62	13	35	-	42
GUYANA	96	95	82	95	-	-
HAITI	150	79	38	21	36	3
HONDURAS	113	84	100	55	43	42
HUNGARY	43	-	-	99	-	-
ICELAND	5	100	-	100	-	50
INDIA	128	60	73	34	16	37
INDONESIA	109	90	81	56	8	52
IRAN, ISLAMIC REP.	97	77	48	86	-	66
IRAQ	126	78	51	54	-	-
IRELAND	18	-	-	100	-	-
ISRAEL	23	90	-	99	-	-
ITALY	19	99	-	100	-	-
JAMAICA	83	99	52	95	-	-
JAPAN	9	-	-	100	-	-
JORDAN	92	91	18	97	32	15
KAZAKHSTAN	73	92	-	98	10	59
KENYA	138	92	44	44	58	17
KOREA, DEM. PEOPLE'S REP	-	100	5	100	-	97
KOREA, REP. OF	31	96	71	98	-	-
KUWAIT	36	95	70	98	-	-
KYRGYZSTAN	98	97	-	98	53	31
LAO PEOPLE DEM REP	140	25	36	14	-	39
LATVIA	63	-	-	100	-	-
LEBANON	82	87	-	89	15	41
LESOTHO	127	89	-	50	-	54
LIBERIA	-	83	14	58	-	-
LIBYAN ARAB JAMAHIRIYA	72	81	-	94	22	52
LITHUANIA	52	-	-	95	-	-
LUXEMBOURG	17	99	-	100	-	-
MACEDONIA, TFYR	69	100	-	97	-	45
MADAGASCAR	141	58	35	47	34	61
MALAWI	163	90	97	55	59	11
MALAYSIA	61	90	81	96	-	-
MALDIVES	89	95	95	90	-	8
MALI	165	46	62	24	10	13
MALTA	27	-	-	98	-	-
MAURITANIA	147	49	13	40	5	60
MAURITIUS	71	99	75	97	20	16
MEXICO	55	86	67	86	-	38
MOLDOVA, REP.	102	99	-	-	8	-
MONGOLIA	117	89	-	93	-	64
MOROCCO	124	45	36	40	43	31
MOZAMBIQUE	168	70	53	44	81	38
MYANMAR	125	80	64	56	-	-
NAMIBIA	115	88	81	68	55	22
NEPAL	144	25	65	9	18	83
NETHERLANDS	8	95	80	100	-	-
NEW ZEALAND	20	95	-	95	-	-
NICARAGUA	116	82	100	65	80	29

Country	Human Development Index rank	Percent of pregnant women with at least one antenatal visit 1995-99	Percent of pregnant women with at least two tetanus toxoid immunizations 1997-99	Percent of births attended by skilled personnel 1995-2000	Percent of babies breastfed in the first hour of life 1995-99	Percent of babies aged 0-4 months exclusively breastfed (24 hour recall) 1995-99
NIGER	173	38	19	18	28	1
NIGERIA	151	60	29	33	33	22
NORWAY	2	-	-	100	71	-
OMAN	86	98	-	91	83	31
PAKISTAN	135	27	51	19	9	16
PANAMA	59	72	-	90	-	32
PAPUA NEW GUINEA	133	78	14	53	-	75
PARAGUAY	81	89	32	71	30	7
PERU	80	67	57	56	44	63
PHILIPPINES	77	86	38	56	42	47
POLAND	44	98	-	99	65	60
PORTUGAL	28	99	-	98	-	41
QATAR	42	100	-	98	-	-
ROMANIA	64	-	-	99	-	-
RUSSIAN FED	62	-	-	99	-	-
RWANDA	164	94	83	26	20	61
SAUDI ARABIA	75	90	66	91	-	31
SENEGAL	155	82	45	47	16	16
SIERRA LEONE	174	68	25	42	-	2
SINGAPORE	24	100	-	100	-	-
SLOVAKIA	40	-	-	95	-	-
SLOVENIA	29	98	-	100	-	-
SOLOMON ISLANDS	121	71	55	85	-	-
SOMALIA	-	40	16	2	-	1
SOUTH AFRICA	103	94	26	84	-	10
SPAIN	21	-	-	96	-	-
SRI LANKA	84	80	91	94	-	24
SUDAN	143	54	62	86	60	14
SWAZILAND	112	70	96	56	-	37
SWEDEN	6	100	-	100	-	-
SWITZERLAND	13	99	-	99	67	48
SYRIAN ARAB REPUBLIC	111	33	94	76	22	-
TAJIKISTAN	110	71	-	71	-	19
TANZANIA, U. REP. OF	156	82	77	35	59	41
THAILAND	76	86	90	71	-	4
TOGO	145	82	48	51	19	15
TRINIDAD & TOBAGO	50	98	-	98	-	10
TUNISIA	101	79	80	81	38	12
TURKEY	85	68	36	81	21	9
TURKMENISTAN	100	90	-	96	-	54
UGANDA	158	91	49	38	49	70
UKRAINE	78	100	-	100	-	82
UNITED ARAB EMIRATES	45	97	-	99	25	-
UNITED KINGDOM	10	99	-	98	46	<16
UNITED STATES	3	99	-	99	-	19+
URUGUAY	39	94	-	100	-	-
UZBEKISTAN	106	97	-	96	19	22
VENEZUELA	65	74	88	95	-	7
VIET NAM	108	71	85	77	27	29
YEMEN	148	33	26	22	47	25
YUGOSLAVIA	-	-	-	93	-	11
ZAMBIA	153	96	55	47	58	11
ZIMBABWE	130	93	58	84	40	16

**TABLE I NEWBORN HEALTH STATUS****Human Development Index rank**

**Definition** A composite indicator of development status developed by UNDP, including: Life expectancy at birth; Educational achievement (composed of adult literacy and combined gross primary, secondary and tertiary enrollment); and Real GDP per capita.

**Justification for inclusion** This is a broad, well-recognized indicator of development status. Some countries have a low rank for HDI, and yet have relatively low NMR, such as Cuba.

**Sources** From The World Development report 1999, UNDP, for 176 countries. Available on the web at [www.undp.org/hdro/index.html](http://www.undp.org/hdro/index.html)

**Data quality and limitations of the indicator** This composite index involves six indicators, and the quality of data varies by country and by indicator, which may affect ranking.

**Neonatal mortality rate**

**Definition** The neonatal mortality rate is the number of liveborn babies who die in the first 28 days after birth, per 1,000 live births.

**Justification for inclusion** Neonatal mortality rate (NMR) is the key newborn survival indicator. Deaths of babies in late pregnancy (fetal deaths or stillbirths) are closely related to early neonatal deaths as the causes are similar. Very limited information is available about the numbers of fetal deaths. The lack of useable data on late fetal deaths also means that we cannot report perinatal mortality, which is the sum of late fetal and early neonatal (first week of life) deaths. The number of neonatal deaths per country was calculated using the estimated births per country from United Nations Population Division 1999.

**Sources** Obtained from a number of sources including: Demographic

and Health Surveys (DHS) and the Centers for Disease Control and Prevention (CDC); nationally reported data from countries with vital registration coverage over 90 percent; a few population-based research trials (references footnoted); WHO estimates for eight countries, using the best available data.

**Data quality and limitations of the indicator** The statistics included for NMR are likely to be underestimated, especially in countries with limited national reporting systems. Even in industrialized countries, neonatal deaths may be under-reported, especially among babies who are very small or die very soon after birth. The data used here are based on national reporting or on population-based surveys such as DHS. The nationally reported data are mainly from industrialized countries, where data quality is determined by the efficiency of the reporting system. Different countries may have different definitions of livebirths and neonatal deaths; for example, some countries do not include a baby dying in the first 24 hours as a livebirth, which may reduce the neonatal mortality rate by as much as 40 percent. The survey data is collected by asking mothers to report neonatal death, and so may underestimate reality as women may not give this information to the interviewer. Global estimates of neonatal (and fetal and perinatal) mortality are generated by the WHO using mortality rates that are adjusted for estimated under-reporting of fetal and neonatal deaths. The first global estimates were produced in 1996, and the 2001 estimates (based on data collected circa 1999) are shown in Table 1, p.14.

**Estimated births per year**

The expected number of births per

year for each country, estimated by United Nations Population Division (1999) using data on current population size and expected births and deaths. The estimated number of births worldwide each year is 129 million.

**Low birth weight rate (%)**

**Definition** The low birth weight rate is the number of babies weighing less than 2,500 grams at birth per 100 live births.

**Justification for inclusion** Birth weight is a strong predictor of the baby's outcome and also a good measure of the health status of the mother. The LBW rate allows calculation of the number of LBW babies per country and gives an estimated global total of 20 million LBW babies.

**Sources** Data were obtained from a number of sources, mainly from WHO/UNICEF (1995-99), WHO review,<sup>83</sup> and specific sources for a few countries.

**Data quality and limitations of the indicator** It is estimated that approximately 50 percent of babies are weighed at birth. In some countries birth weight is recorded for the majority and the nationally reported LBW rate is representative. In other countries the reported LBW rate is based on survey data or on hospital data. Hospital data may overestimate the LBW rate if more complicated deliveries, such as preterm birth, are occurring in hospital. Conversely hospital data may underestimate the LBW rate if hospital deliveries are mainly women of higher socio-economic standing. Even if babies are weighed, weights may be mis-read or mis-recorded.

**Maternal mortality ratio**

**Definition** Maternal mortality ratio is defined as the number of women who die from conditions related to pregnancy, delivery, or related com-



plications, per 100,000 live births. **Justification for inclusion** Maternal outcomes are strongly linked to newborn outcomes, and a newborn whose mother dies has a markedly increased chance of dying.

**Sources** All data was from the WHO/UNICEF estimates based on 1995 data. Hill K, AbouZahr C, Wardlaw T. Estimates of maternal mortality for 1995. Bull WHO, 2001 79(3) 182-193. Available on the web at: [www.childinfo.org/eddb/mat\\_mortal/whobulletin79.pdf](http://www.childinfo.org/eddb/mat_mortal/whobulletin79.pdf)

**Data quality and limitations of the indicator** In the countries where MMR is highest, the precise estimates are the most difficult. Even in industrialized countries maternal deaths may be unrecorded. The methods and limitations of the MMR estimates are discussed in detail in the source document.

## TABLE II NEWBORN HEALTH SERVICES AND PRACTICES

### Antenatal contact with a skilled provider (%)

**Definition** The number of pregnant

women seen at least once by skilled health personnel because of pregnancy, per 100 live births. A skilled provider includes a doctor, midwife, or nurse with midwifery training.

**Justification for inclusion** Skilled care during pregnancy benefits both mothers and newborns.

**Sources** UN Statistics Division (The World's Women 2000), DHS and CDC surveys and UNICEF. The latter is available on the web at [www.childinfo.org/eddb/antenatal/database.htm](http://www.childinfo.org/eddb/antenatal/database.htm)

**Data quality and limitations of the indicator** The main limitation in the quality of this data is the variability in measurement of "skilled" health care provider, as discussed in more detail under the skilled attendance at delivery. This indicator includes only one antenatal visit, and the recommended number is four. If the indicator were changed to four visits this may be a better predictor of newborn and maternal survival, but data are not available on a wide scale to measure this at present.

The content of antenatal care is also important, but is not reflected in this indicator. Even if the attendant

is skilled, if there are no standards for care and no supporting system, for example to test and treat syphilis, the care may have little effect on outcome.

### Tetanus toxoid coverage in pregnant women (%)

**Definition** The number of pregnant women with appropriate tetanus toxoid immunization, per 100 live births. Appropriate tetanus toxoid immunization is considered to be two vaccinations (TT2) that are at least four weeks apart with the second dose a month or more before delivery, or a lifetime total of five or more tetanus immunizations.

**Justification for inclusion** Neonatal tetanus is a leading cause of neonatal deaths. Prevention is highly cost-effective, yet in many countries with high death rates from neonatal tetanus, coverage of pregnant women with TT2 remains low, especially in rural areas where the risk is often higher.

**Sources** Data is based on UNICEF/WHO data (1997-99) as listed in the State of the World's Children 2001.

**Data quality and limitations of the indicator** The data is collected through surveys and national reporting. Women may be unsure of their immunization status or unable to produce records to verify this. The data is adjusted by UNICEF/WHO to allow for reporting issues.

### Skilled attendant at delivery coverage (%)

**Definition** The number of women with skilled attendance at delivery, per 100 live births. A skilled attendant includes a doctor, midwife, or nurse with midwifery training.

**Justification for inclusion** Skilled attendance at delivery is one of the keys to improving the survival of babies and mothers.

**Sources** Based on UNICEF/WHO 1995 - 2000 and DHS data as listed

in the State of the World's Children 2001 available on the web at [www.unicef.org/sowc01/](http://www.unicef.org/sowc01/) and additional data from The State of World Population at [www.unfpa.org/swp/2000/english/indicators/indicators2.html](http://www.unfpa.org/swp/2000/english/indicators/indicators2.html)

**Data quality and limitations of the indicator** The major issues for the quality of this indicator are defining the "skill" of the attendant and reflecting whether the attendant is part of a functioning system. The skill of the attendant is more than a qualification, as a high level of qualification may not correlate with competency. In addition, even a highly skilled attendant will have limited effect in saving the lives of mothers and babies if there is not a functioning system for comprehensive care of complications for the mother or baby, including caesarean section, blood transfusion etc.

#### **Breastfeeding in the first hour of life (%)**

**Definition** The percentage of women with an infant less than one year old who recall breastfeeding within the first hour after delivery.

**Justification for inclusion** Breastfeeding is important for the survival of newborns, but also provides benefits that last a lifetime. If all babies were exclusively breastfed for six months, it is estimated that 1.5 million infant lives would be saved each year. Early breastfeeding ensures that the baby benefits by receiving colostrum, which is rich in Vitamin A and K and in antibodies. The mother also benefits in many ways, including a reduced risk of postpartum hemorrhage.

**Sources** Mainly based on DHS, but also including individual country contacts. Data was especially lacking from Europe.

**Data quality and limitations of the indicator** Information regarding breastfeeding is lacking, particularly from industrialized countries. The data

available are mainly based on surveys relying on the mother's recall of the time she fed her baby in the last delivery, which may be affected by recall bias.

#### **Exclusive breastfeeding at 0–4 months of age (% based on 24 hour recall by the mother)**

**Definition** The percentage of women with infants aged 0–4 months who report feeding their infant breastmilk alone during the last 24 hours. Exclusive breastfeeding is the practice of feeding breastmilk alone to a baby, with no water, formula milk, or cereals. A baby who is given medicines but otherwise only breastmilk is still considered to be exclusively breastfed.

**Justification for inclusion** A baby who is ever breastfed has advantages over the baby who receives no breastmilk. However, the advantages, especially in protection against infections, are much greater if the baby is exclusively breastfed. WHO recommends exclusive breastfeeding to six months of age.

**Sources** Based on UNICEF, DHS, MICS and WHO data as well as individual country contacts.

**Data quality and limitations of the indicator** Indicators assessing exclusive breastfeeding are compromised by the difficulty of measuring "exclusive" breastfeeding. The most common method of assessment is to ask the mother about the infant's intake during the last 24 hours. A study in Sweden compared 24-hour recall of exclusive feeding to a record of babies' intake since birth. The 24 hour recall was found to be about 40 percent higher at 2 and 4 months of age than the "always exclusively breastfed" category from the record of intake.<sup>84</sup> Many industrialized countries do not collect comparable data regarding exclusive breastfeeding.





## SAVING NEWBORN LIVES

## CALL TO ACTION

With the support and collaboration of national decision-makers, community leaders, health care professionals, the private sector, and international donors, the world's newborns can receive the care and resources they need to survive and thrive. Specifically, we call on policymakers to:

- **Establish newborn care as a priority in national health plans and health reform programs.** Four million newborns die within the first month of life; and four million more are stillborn. While death rates of children under the age of five have fallen dramatically in the past two decades, there has been relatively little change in newborn mortality, even though proven, cost-effective solutions exist to save most of these young lives. For further gains in child survival, reducing the newborn mortality rate must become a national and international priority.
- **Strengthen and expand proven cost-effective services.** Promoting services such as tetanus immuniza-

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#### Writer/Editor

Anthony Costello, Women & Children First, United Kingdom  
Victoria Francis  
Ali Byrne  
Claire Puddephatt

#### Technical Consultant

Joy Lawn, Consultant to Save the Children

#### Contributing Editors, Save the Children

Anne Tinker, Director, Saving Newborn Lives  
Patricia Daly  
Gary Darmstadt  
David Marsh  
Judith Moore  
David Oot  
Ron Parlato  
Ccoya Sejas, Bolivia  
Dianne Sherman

#### Editorial Staff

Robin Bell, Save the Children  
Charlotte Storti  
Rebecca Lowery

#### Reviewers

Carla AbouZahr, WHO, Switzerland  
Abhay Bang, SEARCH, India  
Petra ten Hoope-Bender, International Confederation of Midwives, The Netherlands  
Zulfiqar Bhutta, Aga Khan University, Pakistan  
Rose Kambarami, University of Zimbabwe, Zimbabwe  
Jerker Liljestrand, World Bank, United States  
José Martines, WHO, Switzerland  
Dharma Manandhar, MIRA, Nepal  
Claudia McConnell, Women & Children First, United Kingdom  
Natasha Mesko, International Perinatal Care Unit, Institute of Child Health, United Kingdom  
David Osrin, International Perinatal Care Unit, Institute of Child Health, United Kingdom

tion and immediate, exclusive breastfeeding, ensuring the presence of skilled care at birth, and appropriate and early postnatal care for the newborn can help save countless newborn lives. These successful maternal and newborn care practices should be integrated into existing safe motherhood, child survival, and other community health care services.

■ **Conduct appropriate research.** Additional research is required to: identify and test promising new, low-cost approaches and technologies; enhance the understanding of those socio-cultural and economic factors that limit the adoption of improved newborn care practices in local communities; and derive practical lessons from the most successful programs of infant and maternal health and apply them to newborn care.

■ **Foster and promote strategic partnerships.** Adequate financial, human, and material resources will be needed to improve newborn health, through the reallocation of existing resources, increased

efficiency, or additional funding. Collaboration among a wide range of institutions in developed and developing countries—government ministries, international agencies, professional organizations, universities, and private sector organizations—can provide a foundation on which to build newborn care programs. Such collaboration can also provide important opportunities for sharing experiences and knowledge as well as coordinating program efforts.

■ **Support programs that promote women's health.** Newborn survival begins with ensuring the health and nutritional status of the mother and preparation for a safe delivery. Programs need to address barriers that inhibit women's access to information and services, emphasizing community and home-based approaches and the involvement of husbands and other family decision-makers. Expanding access to family planning and improving education and economic opportunities will also contribute substantially to women's health.

#### **SAVING NEWBORN LIVES INITIATIVE**

Save the Children has launched a new effort called Saving Newborn Lives. Supported by the Bill & Melinda Gates Foundation, Saving Newborn Lives is a 10 to 15 year global initiative to improve the health and survival of newborns in the developing world. The initiative works with governments, local communities, and partner agencies at a national level to make progress toward real and lasting change in newborn health.

**SAVE THE CHILDREN** is a leading international nonprofit child-assistance organization working in nearly 50 countries worldwide, including the United States. Our mission is to make lasting, positive change in the lives of children in need. Save the Children is a member of the international Save the Children Alliance, a worldwide network of 30 independent Save the Children organizations working in more than 100 countries to ensure the well-being and protect the rights of children everywhere.

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#### **Journalist**

**Marina Cantacuzino**

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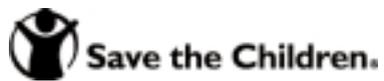
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Saving Newborn Lives  
Save the Children  
2000 M Street, NW  
Suite 500  
Washington, DC 20036

[www.savethechildren.org](http://www.savethechildren.org)



**WOMEN & CHILDREN FIRST**  
**WCF**  
30 Guilford Street  
LONDON WC1R 3JS UK  
TEL: +44(0)20 7091 3010  
FAX: +44(0)20 7091 3010  
WEB: <http://wcf-us.org>  
E-MAIL: [info@wcf-us.org](mailto:info@wcf-us.org)