Strategies to reduce Neonatal Mortality in sub-Saharan Africa

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Starting from the “UN - MDGs”...
Starting from the “UN - MDGs” ...

The Millennium Development Goals

Eight Goals for 2015

1. Eradicate extreme poverty and hunger
2. Achieve universal primary education
3. Promote gender equality and empower women
4. Reduce child mortality
5. Improve maternal health
6. Combat HIV/AIDS, malaria and other diseases
7. Ensure environmental sustainability
8. Develop a global partnership for development

Millennium Declaration

In 2000, 189 nations made a promise to free people from extreme poverty and multiple deprivations. This pledge became the eight Millennium Development Goals to be achieved by 2015. In September 2010, the world recommitted itself to accelerate progress towards these goals.
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Neonatal deaths and the Millennium Development Goal 4

Almost 40% of under 5 deaths are neonatal

Source: Lawn JE et al Lancet 2005
Figure 4: Global causes of child deaths
Data are separated into deaths of neonates aged 0–27 days and children aged 1–59 months. Causes that led to less than 1% of deaths are not presented.
*Includes data for congenital abnormalities.
Neonatal Survival 1

4 million neonatal deaths: When? Where? Why?

Joy E Lawn, Simon Cousens, Jelka Zupan, for the Lancet Neonatal Survival Steering Team*

Lancet 2005; 365: 891–900

A continuum of care to save newborn lives

The global community recently declared a commitment to “create an environment—at the national and global levels alike—which is conducive to development and to the elimination of poverty.” This declaration led to an agreement on eight goals in key areas of global concern: the Millennium Development Goals. Central among those goals are two that aim to reduce maternal and child mortality, goals 4 and 5. Investment in maternal, newborn, and child health is not only a priority for saving lives, but is also critical to advancing other goals related to human welfare, equity, and poverty reduction.

The United Nations has led the global community in articulating a rights-based approach to health, giving special attention to mothers and children. The Universal Declaration of Human Rights, ratified in 1945, states that “motherhood and childhood are entitled to special care and assistance.” The Convention on the Rights of the Child, ratified in 1989, guarantees children the highest attainable standard of health.*

The international consensus documents focusing on maternal and child health: the Millennium Development Goals, the new 1986 rights framework, and the Convention on the Rights of the Child—contribute to the scientific literature on neonatal survival. All three address the social, economic, and institutional factors that contribute to maternal and child mortality.

In this second article of the neonatal survival series, we identify 16 interventions with proven efficacy (implementation under ideal conditions) for neonatal survival and combine them into packages for scaling up in health systems, according to three service delivery modes (outreach, family-community, and facility-based clinical care). All the packages of care are cost-effective compared with single interventions. Universal (99%) coverage of these interventions could avert an estimated 41–72% of neonatal deaths worldwide. At 90% coverage, intrapartum and postnatal packages have similar effects on neonatal mortality—two-fold to three-fold greater than that of antenatal care. However, running costs are two-fold higher for intrapartum than for postnatal care. A combination of universal—ie, for all settings—outreach and family-community care at 90% coverage averts 18–37% of neonatal deaths. Most of this benefit is derived from family-community care, and greater effect is seen in settings with very high neonatal mortality. Reductions in neonatal mortality that exceed 50% can be achieved with an integrated, high-coverage programme of universal outreach and family-community care, consisting of 12% and 26%, respectively, of total running costs, plus universal facility-based clinical services, which make up 60% of the total cost. Early success in avertting neonatal deaths is possible in settings with high morbidity and weak health systems through outreach and family-community care, including health education to improve home-care practices, to create demand for skilled care, and to improve care seeking. Simultaneous expansion of clinical care for babies and mothers is essential to achieve the reduction in neonatal deaths needed to meet the Millennium Development Goal for child survival.
Neonatal mortality has declined in all world regions. Progress has been slowest in the regions with high NMRs.

“... Global health programs need to address neonatal deaths more effectively if Millennium Development Goal 4 (two-thirds reduction in child mortality) is to be achieved ... “
Globally, the average NMR has fallen by more than a quarter over 20 y, from 33.2 to 23.9 per 1,000 livebirths, or an average of 1.7% per year.
Among the 15 countries with the highest NMRs (all above 39), 13 were from the African region:

D.R.Congo, Mali, Sierra Leone, Guinea-Bissau, Chad, Central African Republic, Burundi, Angola, Mauritania, Mozambique, Guinea, Equatorial Guinea, and Somalia.

Of the 40 countries with the highest NMRs in 2009 only six are from outside the African continent:

Afghanistan, Pakistan, India, Bhutan, Myanmar, and Cambodia
The proportion of child deaths that occur in the neonatal period has increased in all regions of the World:

globally the proportion increased

from 37% in 1990
to 41% in 2009.

The Africa region saw the smallest reduction in NMR, with a total reduction of only 17.6% (1.0% per year) between 1990 and 2009.

The Africa region saw the smallest reduction in NMR, with a total reduction of only **17.6%** (1.0% per year) between 1990 and 2009.

In eight countries **NMRs are estimated to have increased** over these 20 ys.:

Cameroon, Chad, Congo, Nauru, Niue, South Africa, Trinidad and Tobago, and Zimbabwe.
Major causes of neonatal deaths

The most recent systematic evaluation of child causes of deaths is for year 2008 [Black 2010].

Major causes of neonatal deaths globally in 2008 were estimated to be complications from preterm delivery (28%), asphyxia (23%), and infections with sepsis and pneumonia as the major causes contributing a combined 25% of neonatal deaths.

Sub-Saharan Africa’s Mothers, Newborns, and Children: Where and Why Do They Die?

Mary V. Kinney, Kate J. Kerber1, Robert E. Black, Barney Cohen, Francis Nkrumah, Hoosen Coovadia, Paul Michael Nampala, Joy E. Lawn, on behalf of the Science in Action: Saving the lives of Africa’s mothers, newborns, and children working group

<www.plosmedicine.org>
The five biggest challenges for maternal, newborn, and child health in sub-Saharan Africa are:

– pregnancy and childbirth complications,
– newborn illness,
– childhood infections,
– malnutrition,
– and HIV/AIDS.
MDG 5: Improve Maternal Health

Progress towards MDG 5 in sub-Saharan Africa

Maternal mortality ratio (per 100,000 live births)

- Maternal Mortality Ratio (UN)
- Maternal Mortality Ratio (IHME)
- MDG 5 Target

Note: Trend comparison is uncertain as methodology has changed over time. The range lines indicate the uncertainty bounds of the data.
Nearly 4.7 million mothers, newborns, and children die each year in sub-Saharan Africa:

- 265,000 mothers die due to complications of pregnancy and childbirth;
- 1,208,000 babies die before they reach one month of age;
- 3,192,000 children, who survived their first month of life, die before their fifth birthday.

This toll of more than 13,000 deaths per day accounts for half of the world’s maternal and child deaths.
In addition, in sub-Saharan Africa an estimated 880,000 babies are stillborn and remain invisible on the policy agenda.

Nearly one-third of all stillbirths occur during labor and are difficult to distinguish from early neonatal deaths.

Many of these deaths are preventable with the same solutions that would save many mothers and newborns.
MDG 4 calls for a two-thirds reduction in the under-5 mortality rate (U5-IMR) between 1990 and 2015.

At a regional level, almost no advancement was made in reaching this goal during the 1990s; yet, since 2000 there has been some progress.
Neonatal mortality is maximal in first days of life: intrapartum care is critical.

**Neonatal Survival 1**

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*Figure 3: Daily risk of death during first month of life based on analysis of 47 DHS datasets (1995–2003) with 10,048 neonatal deaths. Deaths in first 24h recorded as occurring on day 0, or possibly day 1, depending on interpretation of question and coding of response. Preference for reporting certain days (7, 14, 21, and 30) is apparent.*
Causes of Neonatal Mortality in Sub-Saharan Africa

- Preterm: 28%
- Sepsis/Pneumonia: 28%
- Intrapartum-related: 28%
- Congenital: 7%
- Other causes: 3%
- Tetanus: 3%
- Diarrhea: 3%
Causes of Neonatal Mortality in Sub-Saharan Africa

75% LBWI (birth weight < 2500g.)

- Preterm, 28%
- Intrapartum-related, 28%
- Sepsis/Pneumonia, 28%
- Tetanus, 3%
- Diarrhea, 3%
- Congenital, 7%
- Other causes, 3%

Causes of Neonatal Mortality in Sub-Saharan Africa

- Preterm, 28%
- Intrapartum-related, 28%
- Nosocomial infections
- Sepsis/Pneumonia, 28%
- Tetanus, 3%
- Diarrhea, 3%
- Congenital, 7%
- Other causes, 3%

Lower resilience to phyoetal distress
Causes of Neonatal Mortality in Sub-Saharan Africa

Preterm, 28%

Hypothermia

Sepsis/Pneumonia, 28%

Intrapartum-related, 28%

Congenital, 7%

Other causes, 3%

Diarrhea, 3%

Tetanus, 3%
Infant’s temperature and survival rate.

(Prof. Pierre Constant Budin: “Le nourrisson”, Paris, 1900)

TEMPERATURE °C  |  SURVIVAL RATE
---|---
32.5 - 33.5 °C  |  10 %
36.0 - 37.0 °C  |  77 %

*: Infant temperature at the admission.
Causes of Neonatal Mortality in Sub-saharian Africa

75% LBWI (birth weight < 2500g.)

- Preterm, 28%
- Intrapartum-related, 28%
- Sepsis/Pneumonia, 28%
- Congenital, 7%
- Tetanus, 3%
- Diarrhea, 3%
- Other causes, 3%

Causes of Neonatal Mortality in Sub-saharian Africa

- Preterm, 28%
- Insufficient caloric intake
- 75% LBWI (birth weight < 2500g.)
- Sepsis/Pneumonia, 28%
- Tetanus, 3%
- Diarrhea, 3%
- Congenital, 7%
- Other causes, 3%
- Intrapartum-related, 28%
FEEDING

Ensure that the baby is fed as soon as possible after birth (within one hour if possible) or within three hours of admission unless feeding should be delayed because of a specific problem. If possible, admit the mother when admitting the baby. Encourage the mother to breastfeed the baby or to give expressed breast milk; support whichever method of feeding the mother chooses.

TABLE C-4  Total daily feed and fluid volumes for babies\textsuperscript{a} from birth

<table>
<thead>
<tr>
<th>Day of Life</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7+</th>
</tr>
</thead>
<tbody>
<tr>
<td>ml/kg body weight of feeds and/or fluid</td>
<td>60</td>
<td>80</td>
<td>100</td>
<td>120</td>
<td>140</td>
<td>150</td>
<td>160+</td>
</tr>
</tbody>
</table>
Mortality ...

... Morbidity
Frequency of morbidity in near-term infants

Background: There is little information on the relative frequency of common morbidities in infants born near to term (34-37 weeks)

Methods: Analysis of a database of 73088 live born without malformations (Montreal, Canada)

Results:

<table>
<thead>
<tr>
<th>Gestational Age</th>
<th>34wks</th>
<th>35wks</th>
<th>36wks</th>
<th>39-41wks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resuscitation at delivery</td>
<td>6.6%</td>
<td>1.3%</td>
<td>0.5%</td>
<td>0.4%</td>
</tr>
<tr>
<td>RDS</td>
<td>3.7%</td>
<td>1.6%</td>
<td>1.0%</td>
<td>0.004%</td>
</tr>
<tr>
<td>Phototherapy</td>
<td>47%</td>
<td>27%</td>
<td>8.5%</td>
<td>3.5%</td>
</tr>
<tr>
<td>Gavage</td>
<td>71%</td>
<td>36%</td>
<td>5.4%</td>
<td>0.8%</td>
</tr>
</tbody>
</table>

Conclusions: Infants born near term require substantial extra resources. Even mild degrees of immaturity have substantial effects on postnatal adaptation.
Sub-Saharan Africa is the region with the lowest density of total health workers:

\[ \frac{2.3}{1,000} \] population,

compared to Europe with 18.9.
Many sub-Saharan African Countries depend on mid-level Health Workers

• A shortage of qualified health workers is a major constraint for accessing essential health care in Africa, which suffers more than 24% of the global burden of disease, and yet has only 3% of the world’s health workers.
“Task shifting”

• Simpler tasks may be shifted to the lower level such as the use of community health workers for example for immunization, contraceptive services or community case management of childhood illness.
“Task shifting”

More complex tasks can be delegated to mid level health worker with appropriate training.

- For example, in Malawi, Mozambique, and Tanzania, around 90% of emergency obstetric operations, including caesarean sections are performed by ‘Clinical Officers’.

- Great challenges are the greater professional recognition, and the salary enhancements.

Interventions and "Health Packages"

"Vertical approaches":
that focus on specific donor agendas, disease priorities, and interventions.

"Horizontal approaches":
that aim to strengthen the overall structure and functions of the health system.

Bridging this artificial division may increase the efficiency of health service delivery systems: cost-effectiveness is enhanced and available human resources are maximized.
The continuum of care is a core organizing principle for health systems that emphasizes linkages between health care across time and through various services.

Wherever care is provided: at home, the primary care level, and at district and regional hospitals.
Integrated PACKAGES for MNCH, with evidence-based interventions along the continuum of care, organized by lifecycle and place of service delivery.

PLoS Med 7(6): e1000294; June 21, 2010  Figure from Kinney et al. 2009, adapted from Kerber et al. 2007

<table>
<thead>
<tr>
<th>Clinical</th>
<th>Reproductive Health Care</th>
<th>Antenatal Care</th>
<th>Postnatal Care</th>
<th>Child Health Care</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Post-abortion care, TOP where legal&lt;br&gt;- STI case management&lt;br&gt;</td>
<td>- Family planning&lt;br&gt;- Prevention and management of STIs and HIV&lt;br&gt;- Peri-conceptual folic acid</td>
<td>- 4-visit focused package&lt;br&gt;- IPTp and bednets for malaria&lt;br&gt;- PMTCT</td>
<td>- Promotion of healthy behaviours&lt;br&gt;- Early detection of and referral for illness&lt;br&gt;- Extra care of LBW babies&lt;br&gt;- PMTCT for HIV</td>
<td>- Immunizations, nutrition, e.g. Vitamin A and growth monitoring&lt;br&gt;- IPTi and bednets for malaria&lt;br&gt;- Care of children with HIV including cotrimoxazole&lt;br&gt;- First level assessment and care of childhood illness (IMCI)</td>
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<table>
<thead>
<tr>
<th>Outreach/Outpatient</th>
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<th>Family/Community</th>
<th>Reproductive Health Care</th>
<th>Antenatal Care</th>
<th>Postnatal Care</th>
<th>Child Health Care</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Adolescent and pre-pregnancy nutrition&lt;br&gt;- Education&lt;br&gt;- Prevention of STIs and HIV</td>
<td>- Post-abortion care, TOP where legal&lt;br&gt;- STI case management</td>
<td>- 4-visit focused package&lt;br&gt;- IPTp and bednets for malaria&lt;br&gt;- PMTCT</td>
<td>- Promotion of healthy behaviours&lt;br&gt;- Early detection of and referral for illness&lt;br&gt;- Extra care of LBW babies&lt;br&gt;- PMTCT for HIV</td>
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</table>

Healthy home care including:<br>- Newborn care (hygiene, warmth)<br>- Nutrition including exclusive breastfeeding and appropriate complementary feeding<br>- Seeking appropriate preventive care<br>- Danger sign recognition and careseeking for illness<br>- Oral rehydration salts for prevention of diarrhoea<br>- Where referral is not available, consider case management for pneumonia, malaria, neonatal sepsis

Improved living and working conditions – Housing, water and sanitation, and nutrition education and empowerment
Integrated PACKAGES for MNCH, with evidence-based interventions along the continuum of care, organized by lifecycle and place of service delivery.

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Interventions and “Health Packages”

Packages can be designed based on simpler, specific interventions to achieve a particular outcome, and then become more complex, depending on the functionality of the health system:
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Packages can be designed based on simpler, specific interventions to achieve a particular outcome, and then become more complex, depending on the functionality of the health system:

- Human resource capacity,
- Health facility infrastructure,
- Supply systems,
- Financial resources,
- Government stewardship,
- District-level management,
- Monitoring.
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Although these packages for MNCH interventions exist in nearly all settings, priorities have to be selected in low- and middle-income countries.
Other Factors That Influence Maternal, Newborn, and Child Health

In addition to the direct causes of deaths, poverty and inequity undermine the survival of mothers, newborns, and children.

Intersectoral actions such as expanding educational opportunities, improving living and working conditions, and increasing access to water and sanitation could dramatically improve health outcomes within even one generation.
Gender discrimination

Low levels of female education, and lack of empowerment prevent women from seeking care, having the autonomy to make decisions, and accessing the best choices for themselves and their children’s health,

resulting in critical delays and unnecessary deaths.

Urban and rural populations

The urban/rural divide also affects MNCH and access to health care.

Mortality is consistently lower in urban areas than in rural areas, with remote communities often having poorer access to care.
However, rapid urbanization is associated with crowded living conditions, poor sanitation, and widespread poverty.

Thus, even these urban averages mask disparities for the fast-growing poor population of urban and peri-urban areas.
Crisis

Complex emergencies, such as conflict and natural disasters, present considerable challenges to delivering MNCH services and maintaining a functional health system.

- These situations are often marked by a lack of equipment and supplies, poor referral systems, bad and worsening conditions of health facilities, loss of human resources for health, and deteriorating transportation networks.
Countries experiencing conflict also tend to have higher mortality rates due to unstable institutions and weak health systems. Most of the ten countries in sub-Saharan Africa with the highest mortality rates have seen recent complex emergencies including: Democratic Republic of the Congo, Angola, Liberia, Sierra Leone, and others.

One study in the Democratic Republic of the Congo found that maternal deaths were more common in the conflict-ridden eastern provinces, 1,174 maternal deaths per 100,000 live births, compared to in the west where the rate was 811 deaths per 100,000 live births

“... Corruption, authoritarian regimes, weak institutions, and limited freedoms... can also inhibit access to effective care for mothers, newborns, and children.”
Finally, health care is simply **unaffordable** for many families in sub-Saharan Africa.

**User fees** and cost-sharing arrangements remain a **major barrier** to accessing health services, especially for the poor.
Current Gaps in Coverage, Equity, and Quality

Coverage at critical time points along the continuum of care in sub-Saharan Africa, around 2008

- Contraceptive prevalence rate: 23%
- ANC visits (>1): 71%
- Skilled attendant: 46%
- Postnatal care within 2 days*: 31%
- Under5s with suspected pneumonia receiving antibiotics+: 29%
- DPT3 vaccination: 72%

Note: The triangle and square signify the countries with the lowest and highest coverage for each intervention, respectively.
Current Gaps in Coverage, Equity, and Quality

Coverage at critical time points along the continuum of care in sub-Saharan Africa, around 2008

- Mauritius
- Ethiopia

Note: The triangle and square signify the countries with the lowest and highest coverage for each intervention, respectively.
the Coverage Gap

The Coverage Gap is the difference between current coverage and full or universal coverage that reaches all families with essential care.
the Coverage Gap: Missed Opportunities

Figure 2. Achievable coverage increases by addressing the quality gap for facility births in Uganda. The figure shows current coverage for some key facility-based MNCH interventions in Uganda with arrows indicating the modeled increase to the current coverage of institutional births within two years. Data from Uganda Demographic Health Survey, 2006. Some

Abbreviations: BEmOC, Basic Emergency Obstetric Care; CEmOC, Comprehensive Emergency Obstetric Care;

The Equity Gap is the difference between the care received by the richest families compared to the poorest families.

The Equity Gap is hidden by national averages: large disparities exist between rich and poor people and areas, public and private health sectors, provinces or districts, and among rural, urban, and periurban populations.
Inequalities within Countries

![Bar chart showing under-5 mortality per 1000 for different income quintiles in Indonesia, Brazil, India, and Kenya.](image)}
Quality service provision requires the availability of people with appropriate skills and the essential equipment and drugs.

Quality must improve and remain high in order to provide effective care and to maintain demand for health services.
The Quality Gap is the difference between coverage of the basic package and provision of effective and client friendly care.
The quality of care at birth, especially provision of cesarean section and neonatal resuscitation, are sensitive indicators of health system quality and performance.
The example of the Kangaroo Mother Care

As newborn health has come to global attention only recently, some key high impact innovations are still not included in routine programs.

One example is Kangaroo Mother Care, that provides warmth, increases feeding, reduces infections, with more rapid recognition of illness.

New evidence shows that hospital-based Kangaroo Mother Care reduces deaths for babies under 2,000 grams by 51%.

An important area of research is around whether Kangaroo Mother Care can be safely initiated in the communities.
Consideration of Local Data and different Health System settings is necessary to identify high-impact, short-term opportunities that are appropriate and feasible for given Health System environments.

There is a gap in the use of local and representative data to inform policy, practice, and research priorities.

Consideration of Local Data and different Health System settings is necessary to identify high-impact, short-term opportunities that are appropriate and feasible for given Health System environments.
## Table 3. Lives saved and costing results for MNCH in the nine countries.

<table>
<thead>
<tr>
<th>Step</th>
<th>Scale-Up</th>
<th>Percent of deaths averted (lives saved)</th>
<th>Additional cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1</td>
<td>Achievable scale-up of selected MNCH outreach interventions by increasing coverage by 20%*</td>
<td>22% of MNC deaths averted (486,000 in all 9 countries†)</td>
<td>US$ 1.21 per capita</td>
</tr>
<tr>
<td>Step 2</td>
<td>Achievable scale-up of selected maternal and newborn facility-based interventions by ensuring all facility births received the interventions</td>
<td>26% of MN deaths averted in 7 countries (105,000 in the selected middle and high context countries†)</td>
<td>US$ 0.54 per capita</td>
</tr>
</tbody>
</table>

*Specific interventions included in the analysis are available in Table 2 and Table S1. Additional costing results are available in Table S2.
†The nine selected countries are Cameroon, Ethiopia, Ghana, Kenya, Nigeria, Senegal, South Africa, Tanzania, and Uganda.
‡Step 2 percent based only on maternal and neonatal deaths averted in the middle and high impact countries; Ethiopia and Northern Nigeria are excluded.
What is needed for a safe Childbirth:

**Warmth**
- Prepare the Delivery Room and warm tissues
- Dry the Baby
- Prevent the heat loss
- Delay the bath
- Transfer the Baby with the Mother
- Check the temperature

**Breathing**
- Train the Personnel
- Check the Baby
- Avoid unnecessary procedures
- Immediate Resuscitation when needed
- Prevent Hypothermia
- Careful Post-Resuscitation Management

**Hygiene**
- Sterility in the Delivery Room
- Use Gloves
- Avoid unnecessary procedures
- Cord and Eyes Prophylaxis
- Early recognition and treatment of infections
- Short Hospital stay

**Breastfeeding**
- Woman involvement
- Friendly environment for childbirth
- Safe demedicalisation
- Short Hospital stay
- Parents counseling at discharge

For references see PCPNC and MNP manuals