Improving maternal and newborn health: Are we making progress?

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Background

• Each year
  • Half a million women die during pregnancy or childbirth
  • Nearly 4 million newborns die in the first 28 days of life, accounting for 38% of mortality in children aged less than 5

• Vast majority these deaths occur in developing countries

• Millennium Development Goals (MDGs)
  • Reduce child mortality by two thirds (MDG Four) between 1990 and 2015
  • Reduce maternal mortality by three quarters (MDG Five) between 1990 and 2015
Annual per cent change in maternal deaths, 1990 to 2006

Source: Hogan MC et al. Institute for Health Metrics and Evaluation
Metrics of intra-partum care

• Majority of maternal and neonatal deaths occur during labor, delivery or the first 24 hours after birth

• Many of these are avertable through the delivery of high-quality intra-partum care
  • Clean delivery practices, caesarean section, neonatal resuscitation, etc

• Monitoring of intra-partum care focused on the method of delivery
  • Skilled birth attendance (SBA) coverage: fraction of births with a skilled attendant, i.e. nurse, doctor or midwife, present
  • In-facility delivery (IFD) coverage: fraction of births delivered in a health facility

• SBA coverage an official indicator for MDG Five
Measuring the coverage of SBA and IFD

• Estimated trends in the coverage of SBA and IFD for countries from Global Burden of Disease developing country regions
  • 151 countries
  • 1986 to 2007

• Systematic synthesis of available data
  • 259 surveys with micro-data are available
  • 147 survey reports

• Validated approaches for estimating time trends in coverage
  • Impute missing data and estimate uncertainty
  • Bi-directional distance dependent regression (BDDR)
SBA and IFD coverage in GBD developing countries, 1986 to 2007
Skilled birth attendance coverage in 1990

SBA Coverage
- 0-9%
- 10-19%
- 20-29%
- 30-39%
- 40-49%
- 50-59%
- 60-69%
- 70-79%
- 80-89%
- 90-100%
- No data: predicted results
Skilled birth attendance coverage in 2007

SBA Coverage
- 0-9%
- 10-19%
- 20-29%
- 30-39%
- 40-49%
- 50-59%
- 60-69%
- 70-79%
- 80-89%
- 90-100%

No data: predicted results
Annual change in skilled birth attendance coverage, 1990 to 2007

SBA Coverage
- Declined
- 0-0.9 percentage points
- 1-1.9 percentage points
- 2 or more percentage points
- No data: predicted results

Average Annual Change in SBA Coverage: 1990-2007
Projections of SBA coverage to 2015

• Based on the average annual change for the period 2000 to 2007, by 2015
  • 81 of the 151 will have SBA coverage greater or equal to 90%
  • 55 will have SBA coverage of between 50% and 90%
  • 15 countries will have SBA coverage of less than 50%

• Afghanistan, Bangladesh, Burundi, Chad, Eritrea, Ethiopia, Guinea, Haiti, Kenya, Laos, Madagascar, Nepal, Niger, Sierra Leone and Somalia
Measuring only coverage is insufficient

- Quality of intra-partum care depends on a host of factors
  - Training and skill of the provider
  - Availability of technology
  - Timeliness of diagnosis and care

- Impact of a skilled attendant or facility delivery on health outcomes may vary across settings

- Little or no evidence on the effectiveness of intra-partum care, as it is currently delivered, in improving health outcomes
Measuring the effectiveness of SBA and IFD

• Individual-level data from 26 Demographic and Health Surveys

• Treatment compared to birth outside of a facility without a skilled attendant
  • Skilled birth attendant
  • In-facility delivery

• Outcome
  • Neonatal death

• Exactly matched treated observations to control observations
  • singleton or multiple birth; first-born; birth interval (less than 12 months, 12 to 23 months, 24+ months); mother’s age at time of birth (15 to 24 years, 25 to 34 years, 35+ years); mother’s education (none, primary, secondary or higher); and household wealth (by within-country quintile)
Effectiveness of SBA and IFD

- In-facility delivery: pooled relative risk reduction was 12% (8 to 15)
- Skilled birth attendance: RRR was 14% (11 to 17)
- SBA outside of a facility: RRR was 21% (15 to 28)

- Most likely due to residual endogeneity associated with IFD, e.g. mothers experiencing complications during labor are rushed to a facility to give birth
<table>
<thead>
<tr>
<th>Country</th>
<th>Survey year</th>
<th>Matched sample size</th>
<th>% of treated retained</th>
<th>Relative risk (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bolivia</td>
<td>2004</td>
<td>6,184</td>
<td>3,609</td>
<td>92% 0.34 (0.27 to 0.43)</td>
</tr>
<tr>
<td>Indonesia</td>
<td>2003</td>
<td>10,515</td>
<td>5,263</td>
<td>98% 0.43 (0.35 to 0.54)</td>
</tr>
<tr>
<td>Benin</td>
<td>2006</td>
<td>11,050</td>
<td>3,458</td>
<td>88% 0.50 (0.41 to 0.60)</td>
</tr>
<tr>
<td>Malawi</td>
<td>2000</td>
<td>6,681</td>
<td>5,068</td>
<td>98% 0.70 (0.59 to 0.82)</td>
</tr>
<tr>
<td>Ethiopia</td>
<td>2000</td>
<td>1,122</td>
<td>8,856</td>
<td>98% 0.71 (0.53 to 0.95)</td>
</tr>
<tr>
<td>Egypt</td>
<td>2008</td>
<td>8,355</td>
<td>2,393</td>
<td>99% 0.72 (0.51 to 1.03)</td>
</tr>
<tr>
<td>Honduras</td>
<td>2006</td>
<td>6,049</td>
<td>4,308</td>
<td>93% 0.75 (0.56 to 1.01)</td>
</tr>
<tr>
<td>Malawi</td>
<td>2005</td>
<td>6,053</td>
<td>4,673</td>
<td>98% 0.75 (0.62 to 0.92)</td>
</tr>
<tr>
<td>Indonesia</td>
<td>1994</td>
<td>7,603</td>
<td>10,325</td>
<td>99% 0.76 (0.64 to 0.90)</td>
</tr>
<tr>
<td>Mali</td>
<td>2001</td>
<td>4,887</td>
<td>8,255</td>
<td>95% 0.77 (0.66 to 0.88)</td>
</tr>
<tr>
<td>Mozambique</td>
<td>2004</td>
<td>5,316</td>
<td>4,643</td>
<td>95% 0.78 (0.65 to 0.93)</td>
</tr>
<tr>
<td>Indonesia</td>
<td>2007</td>
<td>12,652</td>
<td>5,563</td>
<td>98% 0.78 (0.64 to 0.95)</td>
</tr>
<tr>
<td>India</td>
<td>1993</td>
<td>18,001</td>
<td>30,511</td>
<td>100% 0.79 (0.72 to 0.87)</td>
</tr>
<tr>
<td>Mali</td>
<td>2006</td>
<td>6,314</td>
<td>7,566</td>
<td>97% 0.80 (0.69 to 0.93)</td>
</tr>
<tr>
<td>Burkina Faso</td>
<td>2003</td>
<td>4,223</td>
<td>6,165</td>
<td>96% 0.81 (0.65 to 1.00)</td>
</tr>
<tr>
<td>Indonesia</td>
<td>1997</td>
<td>8,770</td>
<td>8,429</td>
<td>98% 0.81 (0.67 to 0.96)</td>
</tr>
<tr>
<td>Peru</td>
<td>2000</td>
<td>6,651</td>
<td>4,371</td>
<td>96% 0.81 (0.61 to 1.06)</td>
</tr>
<tr>
<td>India</td>
<td>2000</td>
<td>14,302</td>
<td>18,582</td>
<td>100% 0.81 (0.73 to 0.90)</td>
</tr>
<tr>
<td>Indonesia</td>
<td>1991</td>
<td>6,109</td>
<td>9,350</td>
<td>98% 0.87 (0.73 to 1.04)</td>
</tr>
<tr>
<td>India</td>
<td>2006</td>
<td>26,633</td>
<td>24,550</td>
<td>99% 0.92 (0.84 to 1.01)</td>
</tr>
<tr>
<td>Senegal</td>
<td>2005</td>
<td>6,049</td>
<td>4,252</td>
<td>91% 1.01 (0.83 to 1.22)</td>
</tr>
<tr>
<td>Egypt</td>
<td>2000</td>
<td>6,612</td>
<td>4,367</td>
<td>94% 1.09 (0.86 to 1.38)</td>
</tr>
<tr>
<td>Bangladesh</td>
<td>2001</td>
<td>5,934</td>
<td>48,045</td>
<td>100% 1.10 (1.00 to 1.20)</td>
</tr>
<tr>
<td>Peru</td>
<td>1996</td>
<td>8,334</td>
<td>8,921</td>
<td>98% 1.10 (0.92 to 1.31)</td>
</tr>
<tr>
<td>Egypt</td>
<td>2005</td>
<td>9,666</td>
<td>3,705</td>
<td>96% 1.22 (0.94 to 1.57)</td>
</tr>
<tr>
<td>Egypt</td>
<td>1996</td>
<td>5,206</td>
<td>6,686</td>
<td>97% 1.54 (1.27 to 1.88)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>219,271</td>
<td>251,914</td>
<td>97% 0.86 (0.83 to 0.89)</td>
</tr>
</tbody>
</table>
DAH from 1990 to 2007 by channel of assistance

Source: IHME DAH Database
Negative or positive effects of DAH?

- Large fraction of expansion of DAH directed towards HIV/AIDS, tuberculosis, malaria and childhood immunization

- What has been the impact of DAH on maternal and neonatal health?
  - Positive – targeted DAH leads to general health system strengthening
  - Negative – targeted DAH takes scarce resources away from general health service provision

- Crude analysis suggests neither
Correlation between cumulative DAH per capita and changes in SBA and IFD coverage, 2002 to 2007

All GBD Developing countries

<table>
<thead>
<tr>
<th>Type of development assistance</th>
<th>Skilled birth attendance</th>
<th>In-facility delivery</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>-0.04 ( -0.22 to 0.14 )</td>
<td>-0.03 ( -0.21 to 0.15 )</td>
</tr>
<tr>
<td>HIV/AIDS</td>
<td>-0.10 ( -0.27 to 0.09 )</td>
<td>-0.06 ( -0.24 to 0.12 )</td>
</tr>
<tr>
<td>TB</td>
<td>0.00 ( -0.18 to 0.18 )</td>
<td>-0.03 ( -0.20 to 0.16 )</td>
</tr>
<tr>
<td>Malaria</td>
<td>0.03 ( -0.15 to 0.21 )</td>
<td>0.03 ( -0.15 to 0.21 )</td>
</tr>
</tbody>
</table>

Sub-Saharan African countries

<table>
<thead>
<tr>
<th>Type of development assistance</th>
<th>Skilled birth attendance</th>
<th>In-facility delivery</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>-0.10 ( -0.38 to 0.20 )</td>
<td>0.01 ( -0.28 to 0.30 )</td>
</tr>
<tr>
<td>HIV/AIDS</td>
<td>-0.10 ( -0.39 to 0.20 )</td>
<td>-0.02 ( -0.31 to 0.27 )</td>
</tr>
<tr>
<td>TB</td>
<td>0.00 ( -0.30 to 0.29 )</td>
<td>0.04 ( -0.25 to 0.33 )</td>
</tr>
<tr>
<td>Malaria</td>
<td>-0.06 ( -0.35 to 0.24 )</td>
<td>0.04 ( -0.26 to 0.33 )</td>
</tr>
</tbody>
</table>
Implications

• Coverage of SBA and IFD in GBD developing countries has improved only gradually

• No evidence of acceleration in coverage in line with the MDG declaration; many countries by 2015 will have inadequate coverage

• A handful of countries have achieved substantial improvements but none greater than 3% average annual change in SBA coverage; what lessons can be learnt from these countries?

• Results highlight the importance of assessments of coverage over time and the need for better data to track intra-partum care in a continuous fashion
Implications

• First direct evidence that intra-partum care, as it is currently being delivered, appears to be effective in reducing neonatal mortality

• Provides a preliminary way of identifying countries with higher or lower-than average quality of care

• Improved survey instruments may allow better control of endogeneity

• Measurement strategy for assessing the effectiveness of SBA/IFD on maternal outcomes required

• Further analysis of relationship between DAH and changes in SBA and IFD coverage is needed