3. MILLENNIUM DEVELOPMENT GOAL 4 AND INTEGRATION

Reduce under-five mortality rate (Indicator G5.1)

- Substantial progress has been made towards achieving Millennium Development Goal (MDG) 4. The number of deaths of children aged under 5 years worldwide has halved, from 12.7 million in 1990 to 5.9 million in 2015.
- This translates into around 19 000 fewer children dying every day in 2015 than in 1990, but it still implies the deaths of about 16 000 children under the age of 5 every day in 2015.
- Since 1990, the global under-five mortality rate has dropped 53% – from 91 deaths per 1000 live births in 1990 to 43 in 2015. All UN regions, except the Pacific Islands subregion, have more than halved the under-five mortality rate. At country-level, about a third of countries (62) have reduced their under-five mortality by two thirds or more and achieved the MDG 4 target set in 2000. Among them are 24 low- or lower-middle income countries.

Progress towards the achievement of the MDG 4 goal to reduce child mortality is monitored as part of the Countdown 2015 initiative. Progress is measured by the independent Expert Review Group (iERG), based on the recommendations of the Commission on Information and Accountability of the Global Strategy for Women’s and Children’s Health. The salient findings in the Countdown 2015 report and other reports are summarized below, with links to details.

- Overall, substantial global progress has been made in reducing child deaths since 1990. The number of deaths of children aged under 5 years worldwide has declined from 12.7 million in 1990 to 5.9 million in 2015 – 16 000 deaths every day compared with 35 000 in 1990 – and the global under-five mortality rate has dropped 53%, from 91 deaths per 1000 live births in 1990 to 43 in 2015.
- The world as a whole has been accelerating progress in reducing the under-five mortality rate – its annual rate of reduction increased from 1.8% in 1990–2000 to 3.9% in 2000–2015.
- Promisingly, sub-Saharan Africa, the region with the highest under-five mortality rate in the world, has also registered substantive progress. Its annual rate of reduction increased from 1.6% in the 1990s to 4.1% in 2000–2015.
- A total of 21 sub-Saharan African countries have at least tripled their annual rates of reduction from the 1990s or reversed an increasing mortality trend in 2000–2015 compared with the 1990s.
- The remarkable decline in under-five mortality since 2000 has saved the lives of 48 million children aged

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This chapter is extracted from Levels & trends in child mortality. Report 2015, which uses the UN regional classification system.

under 5 years – children who would not have survived to see their fifth birthday if the under-five mortality rate from 2000 onward remained at the same level as in 2000.

- Between 1990 and 2015, 62 of the 195 countries with available estimates met the MDG 4 target of a two thirds reduction in the under-five mortality rate between 1990 and 2015. Among them, 24 are low- and lower-middle-income countries.
- Despite these gains, the 53% decline in the under-five mortality rate globally is far from the two thirds reduction required to meet the MDG 4 target. Progress remains insufficient to reach MDG 4 globally and in many regions, particularly in Caucasus and Central Asia, Oceania, Southern Asia and sub-Saharan Africa.
- Accelerating progress in child survival urgently requires greater attention to ending preventable child deaths in southern Asia and sub-Saharan Africa. In sub-Saharan Africa 1 child in 12 dies before his or her fifth birthday – far higher than the average ratio of 1 in 147 in high-income countries. Southern Asia has the second-highest under-five mortality rate in the world – about 1 child in 19 dies before age 5.
- Globally, the neonatal mortality rate fell from 36 deaths per 1000 live births in 1990 to 19 in 2015, and the number of neonatal deaths declined from 5.1 million to 2.7 million. However, the decline in neonatal mortality from 1990 to 2015 has been slower than that of post-neonatal under-five mortality: 47% compared with 58% globally.
- The share of neonatal deaths is projected to increase from 45% of deaths of children aged under 5 years in 2015 to 52% in 2030. Moreover, 63 countries need to accelerate progress to reach the Sustainable Development Goal (SDG) target of a neonatal mortality rate of 12 deaths per 1000 live births by 2030 – more than the 47 countries for the under-five mortality target.
- Most child deaths are caused by diseases that are readily preventable or treatable with proven, cost-effective and high-quality interventions. Infectious diseases and neonatal complications are responsible for the vast majority of deaths of children aged under 5 years globally.
- The main killers of children aged under 5 years in 2015 include preterm birth complications (18%), pneumonia (16%), intrapartum-related complications (12%), diarrhoea (9%) and sepsis/ meningitis (9%). Importantly, almost half of all deaths of children aged under 5 years are attributable to under-nutrition, while more than 80% of neonatal deaths occur among new-born infants of low birth weight in the highest-burden settings.
- An acceleration of the pace of progress is urgently required to achieve the SDG target on child survival, particularly in high-mortality countries in sub-Saharan Africa. To achieve the SDG target of an under-five mortality rate of 25 or fewer deaths per 1000 live births by 2030, a total of 47 countries need to increase their pace of progress. Among these, 30 countries must at least double their current rate of reduction, and 11 of those 30 countries must at least triple their current rate of reduction.
- In order to continue to accelerate progress, it is critical to ensure that every pregnant woman and every newborn has access to and receives good quality care and life-saving interventions. The vast majority of maternal and newborn deaths can be prevented by relatively straightforward effective interventions. Quality of care in delivering these interventions along the continuum of care during pre-pregnancy, antenatal, intra-partum, childbirth and post-natal periods is paramount to ensure progress.
- Wide gaps in child mortality across subgroups or areas within countries have been documented in the low-mortality countries group of nations, warranting a call for an equity-focused approach to reducing child mortality. For example, Brazil is one of the countries that succeeded in meeting MDG 4 goal, but disparities still persist in the country. Indigenous children are twice as likely to die before reaching their first birthday as other Brazilian children. This example illustrates that even for countries with relatively low levels of mortality, greater efforts to reduce disparities at the subnational level and across different groups are required to achieve equity in child survival and lower mortality levels overall.
- Countries and the international community must take immediate action to further accelerate the pace of progress to fulfil the promise to children. Without intensified efforts to reduce child mortality, particularly in the highest-mortality areas and in contexts of persistent inequities, the SDG targets will be unattainable. Child survival must remain at the heart of the post-2015 SDG agenda.
References


Bibliography

Integration of health care interventions and immunization activities (Indicator G5.2)

DEFINITION OF INDICATOR

The DoV Secretariat is proposing the following revised indicators:

a) Composite Coverage Index (CCI)\(^1\) (1), a weighted average of coverage of a set of eight preventive and curative interventions for the 75 Countdown countries; and

b) Comparative coverage by country of the CCI component interventions in 4 stages of the continuum of care (family planning, maternal and newborn care, immunization and case management of sick children), stratified by countries with CCI < 60, CCI 60–70, CCI > 70

TARGET

No target set

DATA SOURCES

Countdown 2015 Report for CCI

Background

During their review of progress in 2013, the SAGE Decade of Vaccines working group requested the DoV Secretariat to develop an additional monitoring indicator specifically focusing on integration of immunization activities with other health interventions, with the objective of measuring countries efforts in reducing the number of missed opportunities for any preventive interventions aiming at reducing mother and child mortality. In its 2014 GVAP Secretariat report (2) the DoV Secretariat provided data on two indicators:

1. provision of vitamin A with routine or supplementary immunization; and
2. comparative rates of coverage with last dose of rotavirus vaccine, oral rehydration salts (ORS) use during diarrhoea and exclusive breastfeeding for six months.

The SAGE DoV working group was not fully satisfied with the second indicator and requested the DoV Secretariat to explore alternatives. Therefore, in 2015, the DoV Secretariat proposed to replace this indicator with:

- comparative coverage of the first antenatal visit (ANC1), protected at birth against neonatal tetanus (PAB), third doses of DTP (DTP3) and first dose of measles-containing vaccine (MCV1).

In August 2015, the SAGE DoV working group expressed that this was a more meaningful measure of integration and proposed that it could be further improved by presenting countries stratified into three groups depending on their ANC1/DTP3/PAB/MCV1 status\(^2\) (this stratification is presented in Annex 3.1). The SAGE DoV working group suggested consideration of other health interventions to highlight the importance of integrating the whole life-course and the issue of missed opportunities, but acknowledged that data availability limits the potential to reflect integration of health interventions.

Rationale for proposing revised indicators

For the 2016 analysis of the progress in 2015 for integration of immunization with other health services, the DoV Secretariat considered several options. Because the goal of an integration is the "management and delivery of health services so that clients receive a continuum of preventive and curative services" (3) the Secretariat aimed to select an indicator that was more comprehensive than previous reports; and since immunization service delivery "should continue to serve as a platform for providing other priority public health interventions...other priority programmes should also serve as a platform for delivering immunization" (4), the DoV Secretariat sought to select an indicator that would be useful in identifying missed opportunities in both directions (i.e. immunization as a platform for other services and other services as a platform for immunization). In addition, an indicator was sought that uses available data, and could be tracked

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\(^{1}\) Based on the weighted average of coverage of a set of eight preventative and curative interventions; the CCI gives equal weight to four stages in the continuum of care: family planning, maternal and newborn care, immunization and case management of sick children. The weighted average for a group (e.g. a country or a wealth quintile) is calculated as

\[
\frac{1}{4} \left( \text{FPS} + \text{SBA} + \text{ANCS} + \frac{2}{4} \text{DPT3} + \frac{1}{4} \text{MSL} + \frac{1}{4} \text{BCG} + \frac{1}{4} \text{ORT} + \text{CPNM} \right)
\]

FPS is family planning needs satisfied, SBA is skilled birth attendant, ANCS is antenatal care with skilled provider, DTP3 is three doses of diphtheria-pertussis-tetanus vaccine, MSL is measles vaccination, BCG is BCG (tuberculosis) vaccination, ORT is oral rehydration therapy for children with diarrhoea, and CPNM is care seeking for pneumonia. More information at: http://www.countdown2015mnch.org/documents/2015Equity/2015_CD_equity_profiles_all.pdf.


\(^{3}\) Minutes of the 12 August 2015 teleconference of the SAGE Decade of Vaccines working group discussing the GVAP Secretariat report (unpublished).
over time. Five candidate indicators were considered and exploratory analyses were performed to test the feasibility and usefulness of each.

The five possible indicators for integration considered for the 2016 report were, in the 75 Countdown countries:

1. **Vitamin** A provision with routine or supplementary immunization activities
2. a) **Comparative coverage** for ANC1, PAB, DTP3 and MCV1, stratified by countries where
   - ANC1 significantly lower than DTP3/PAB/ MCV1 coverage
   - ANC1 significantly higher than DTP3/PAB/ MCV1 coverage
   - ANC1 and PAB well below DTP3 and MCV1 or
   b) Comparative coverage similar to a) that includes ANC4, PAB, DTP3 and MCV1, family

Proposed revised integration indicators

The DoV Secretariat proposes **option 5** (an analysis using CCI) for the following reasons, and presents the findings herein.

Proposed is a modification of the CCI, a weighted average of coverage of a set of eight preventative and curative interventions for the 75 Countdown countries. Rather than present only a single composite indicator, a modification is presented that includes a comparative coverage of the CCI component interventions in four stages of a continuum of care:

1. family planning needs satisfied
2. maternal and newborn care (skilled birth attendant, antenatal care with skilled provider)
3. immunization (DTP3, MCV1, BCG)
4. case management of sick children (ORS for children with diarrhoea, care seeking for pneumonia).

The Secretariat considered presenting coverage levels for the eight separate interventions, but opted for presenting coverage levels for the four stages to render the data more interpretable. Additionally, to better guide interpretation and design of activities to improve integration, the results are stratified by countries with CCI < 60 (weak health systems), CCI 60–70 (less weak systems), CCI > 70 (stronger systems) (Figure 3.1, Figure 3.2 and Figure 3.3).

Maternal and child health interventions as measured by CCI are well-correlated with child mortality in the first five years of life. At the child level, a unit increase in CCI was associated with an odds ratio of 0.86 for child mortality (95% confidence interval, CI, 0.82–0.90) and ecologically associated with a reduction in child mortality of 29 per 1000 (95% CI -43.2 to -14.7) (5). While encompassing a range of interventions, a composite indicator like CCI provides a single measure for easier cross-country comparisons. Rather than depending on the single index alone, the values are presented for the four stages of the continuum of care to identify the relative standing of the immunization component. Rather than presenting all the components of the CCI, we opted to show the collapsed version of the 8 interventions into the 4 stages of care to render it more interpretable. By presenting the differences between immunization and other services, potential missed opportunities can be identified.

Data availability and quality

The CCI data is from the Countdown Equity Analyses by Country-2015. WUENIC estimates for DTP3, MCV1 and BCG are used in the CCI. Although WUENIC estimates are available annually, for accurate comparability, the immunization estimates used are those included in the CCI (i.e.in the same year as the most recent CCI data). Updated CCI data are not available each year because most elements are from

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43 For a list of the 75 Countdown countries, see: http://www.countdown2015mnch.org/country-profiles.
DHS and MICS surveys. Analyses were limited to data from 2010 forward. CCI data were unavailable (due to lack of recent data or missing data) for 30 Countdown countries.

**Figure 3.1:** Composite Coverage Index (CCI) and coverage for four CCI components in Countdown countries with a CCI < 60% (year indicated for each country)

Source: Countdown to 2015 report data (6).

**Figure 3.2:** Composite Coverage Index (CCI) and coverage for four CCI components in Countdown countries with a CCI 60–70% (year indicated for each country)

Source: Countdown to 2015 report data (6).
Monitoring results: goals, strategic objectives and indicators

Figure 3.3: Composite Coverage Index (CCI) and coverage for four CCI components in Countdown countries\(^a\) with a CCI > 70\% (year indicated for each country)

\(^a\) Countdown countries with available data since 2010.

Source: Countdown to 2015 report data (6).

Figures 3.1–3.3 show the CCI and the coverage of its four components by Countdown country, with stratification by countries with CCI < 60, CCI 60–70, CCI > 70. Across all three categories of CCI, there are several countries with wide variations in the coverage of the four components, suggesting that missed opportunities may exist. Improvements in coverage for some services with low coverage could improve by linking with other services with higher coverage (e.g. immunization). However, particularly in weak health systems, care should be taken to avoid overburdening functioning services without provision of additional human and logistical resources. Of note: in the vast majority of countries, the component with the lowest coverage was either “case management of sick children” or “family planning needs satisfied” (Table 3.1).

<table>
<thead>
<tr>
<th>Categories</th>
<th>Median across all countries</th>
<th>Median across countries with CCI &lt; 60%</th>
<th>Median across countries with CCI 60–70%</th>
<th>Median across countries with CCI &gt; 70%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Family planning needs satisfied</td>
<td>54%</td>
<td>41%</td>
<td>46%</td>
<td>76%</td>
</tr>
<tr>
<td>Maternal and newborn care</td>
<td>78%</td>
<td>65%</td>
<td>78%</td>
<td>86%</td>
</tr>
<tr>
<td>Immunization</td>
<td>82%</td>
<td>69%</td>
<td>89%</td>
<td>88%</td>
</tr>
<tr>
<td>Case management of sick children</td>
<td>49%</td>
<td>38%</td>
<td>53%</td>
<td>59%</td>
</tr>
</tbody>
</table>

Given the higher coverage for immunization and the low coverage for other interventions, particularly family planning and case management of sick children, opportunities should be sought during immunization visits to address low coverage interventions when feasible (e.g. referral for family planning services, counselling parents about when to seek care for sick children).

Immunization was the component with the highest coverage in the majority of countries. In only a few countries (e.g. Indonesia or Gabon), maternal and
newborn care (skilled birth attendant, antenatal care with skilled provider) was higher than immunization. This suggests that there may be missed opportunities for reminders about the importance of child immunization during antenatal care in those countries, although in many of these countries coverage differences between immunization and maternal and newborn care were small.

There are limitations to using the modification of CCI as an indicator for integration. Thirty Countdown countries did not have recent CCI data available (since 2010). Although WUENIC immunization estimates are available annually, updated CCI estimates are not available each year because they are derived from household (DHS and MICS) surveys. The DoV Secretariat opted to time match immunization data with other CCI component data for accurate comparability, so some countries’ data are from a few years ago, although data prior to 2010 was excluded. However, radical changes in maternal child indicators are unlikely over short time spans, so such a comparison should not introduce error. Finally, it should be noted that maternal child health indicators are imperfectly measured. For example, accurately ascertaining “care seeking for pneumonia” is difficult when asking parents retrospectively about clinical presentation.

Countries may wish to perform equity analyses on CCI to better target interventions in their local context. WHO’s Health Equity Assessment Toolkit (HEAT)⁴⁵ is a user-friendly tool that enables health inequality comparisons of numerous maternal child indicators (including CCI) within and across countries.

References


⁴⁵ The tool can be found at: https://whoequity.shinyapps.io/HEAT/.
Option 1. Vitamin A provision with routine or supplementary immunization

Similar to 2014, in 2015, among the 75 Countdown countries, 23 (32%) of countries provided vitamin A with both routine and supplementary immunization activities (Figure A3-1), 24 countries (33%) provided vitamin A only with routine immunization services and nine countries (13%) provided vitamin A only with supplemental immunization activities. In 16 countries (22%) vitamin A was not distributed and in three countries vitamin A was not considered a public health problem. In 2014, the ratio of vitamin A coverage to DTP3 coverage was included in the report but there were questions about the denominators used. For the exploratory analyses this year, the coverage ratio was not calculated because the number of countries with vitamin A data (data are from UNICEF) and the specific countries with data changes from year to year, precluding comparisons over time. In addition coverage comparisons are problematic because vitamin A is typically given on a 6-month schedule starting at 6 months of age in most countries, whereas MCV1 is typically given at 9 months.

Figure A3-1: Countries providing vitamin A supplementation with routine and/or supplementary immunization activities, 2015

Option 2. Comparative coverage levels

In 2015 the SAGE DoV working group requested:

a. Comparative coverage for ANC1, PAB, DTP3 and MCV1, stratified by countries where

- ANC1 significantly lower than DTP3/PAB/ MCV1 coverage
- ANC1 significantly higher than DTP3/PAB/ MCV1 coverage
- ANC1 and PAB well below DTP3 and MCV1.

Exploratory analyses were performed using both 10% (percentage points and 20% differences); see Table A3-1.

Table A3-1: Percentage of women who attended at least ANC1 compared to coverage rates for DTP3 and MCV1 and percentage of live births protected through maternal immunization with at least 2 doses of TT (PAB) for all Countdown countries

<table>
<thead>
<tr>
<th>Number</th>
<th>Number of Countdown countries</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>ANC1 10% lower than all DTP3/PAB/MCV1</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>(4/8 also fit into number 3)</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>ANC1 10% higher than all DTP3/PAB/MCV1</td>
<td>10</td>
</tr>
<tr>
<td>3</td>
<td>ANC1 and PAB below both DTP3 and MCV1</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>(4/8 also fit into number 1)</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>None of these categories</td>
<td>46</td>
</tr>
<tr>
<td>5</td>
<td>ANC1 20% lower than all DTP3/PAB/MCV1</td>
<td>3</td>
</tr>
<tr>
<td>6</td>
<td>ANC1 20% higher than all DTP3/PAB/MCV1</td>
<td>1</td>
</tr>
<tr>
<td>7</td>
<td>ANC1 and PAB below both DTP3 and MCV1</td>
<td>15</td>
</tr>
<tr>
<td>8</td>
<td>None of these categories</td>
<td>56</td>
</tr>
</tbody>
</table>

Source: DTP3, PAB, MCV1, 2014 WUENIC estimates. ANC1, UNICEF global databases 2015 based on DHS, MICS, and other nationally representative surveys.

These analyses pose interpretation challenges because:
1) the large number of countries that fit into no category,
2) the non mutually-exclusive categories when the more inclusive 10 percentage-point difference is used,
3) missing data for ANC1 and PAB (e.g. nine of the 75 countries have no PAB estimates because PAB estimates are made only for countries for which TT vaccination is in the national immunization schedule for pregnant women), and 4) the four indicators represent a limited look at health service delivery during the pregnancy-birth-infant continuum. Therefore, another option was explored, b) below.

b. As a more comprehensive approach to a) above, an analysis was done (called “life course”) which compared coverage for ANC4, PAB, DTP3, MCV1, family planning, skilled birth attendant, postnatal care-mother, postnatal care-baby and exclusive breastfeeding. Initially an attempt was made to group the countries into three groups (uniformly high coverage, uniformly low coverage and wide variation in coverage) based on a 20% difference between highest and lowest coverage within a country. However, there was only one country with a difference less than 20%. The median difference in coverage between the highest and lowest interventions was 55% among the 75 countries. Next a 51% difference between highest and lowest was explored.

Group 1: 15 countries were sorted into 1) uniformly high coverage—their countries had 51% or less difference between the highest and lowest indicators and the highest indicator was equal to or greater than 90%.

Group 2: 18 countries were sorted into 2) uniformly low coverage—these countries had 51% or less difference between the highest and lowest indicators and the highest indicator was less than 90%.

Group 3: 42 countries were sorted into 3) wide variation in coverage—these countries had a greater than 51% difference between the highest and lowest indicator.
However, this categorization was difficult to interpret, especially given the variations that occur with nine component indicators and the large number of countries in group 3. Therefore, exploration was done grouping the countries into eight categories: uniformly high coverage, uniformly low coverage and variation in coverage (subdivided into which CCI intervention had the lowest coverage: FPS, ANC4, SBA, PNC-mother, PNC-baby and EBF). However many countries had missing data for a variety of indicators. Only 34 countries had values for every indicator. One example: nine of the 75 countries have no protected at birth against neonatal tetanus (PAB) estimates because PAB estimates are made only for countries for which TT vaccination is in the national immunization schedule for pregnant women. In addition, the large number of intervention without a standardized index rendered interpretation difficult.

### Option 3. Proportion of 75 Countdown countries that have introduced hepatitis B birth dose (within 24 hours of birth)

Hepatitis B birth dose requires integration of birth dose administration with maternal and newborn care in health facilities or with home visits. Hepatitis B birth dose varies from other vaccinations in that delivery of vaccine is not schedulable, placing special demands on a health system to respond within 24 hours of childbirth. In a test analysis in 2014, 96 of 194 (49%) countries globally and 25 of 75 (33%) Countdown countries had introduced Hepatitis B birth dose.\(^46\) The median coverage in 25 Countdown countries that have introduced was 78%.

### Option 4. Routine immunization offered in school

Twenty-three of the 75 (30.7%) Countdown countries responded yes to having routine doses of vaccine given to children at school (Table A3-2). A total of 52 of the 75 (69.3%) Countdown countries responded no to having routine doses of vaccine given to children at school.

<table>
<thead>
<tr>
<th>Are any routine doses of vaccine given to children at school?</th>
<th>Countries</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>Angola, Bolivia (Plurinational State of), Botswana, Brazil, Egypt, Eritrea, Indonesia, Iraq, Kyrgyzstan, Lesotho, Malawi, Mexico, Mozambique, Papua New Guinea, Peru, Philippines, Rwanda, Sierra Leone, Solomon Islands, South Africa, Swaziland, Uganda, Uzbekistan</td>
</tr>
</tbody>
</table>


\(^a\) Unless otherwise noted, data are taken from 2015.