



Countdown to 2015

Maternal, Newborn & Child Survival



COUNTDOWN TO 2015 DECADE REPORT (2000–2010)

Taking stock of maternal, newborn and child survival

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Countdown to 2015: key messages for 2010

- The *Countdown* report for 2010 contains good news—many countries are making progress, reducing mortality and increasing coverage of effective health interventions at an accelerating pace.
- But the news is not all good. Many *Countdown* countries are still off track for achieving Millennium Development Goals 4 (reduce child mortality) and 5 (improve maternal health), and are not increasing coverage of key health interventions quickly enough.
- *Countdown* countries in Sub-Saharan Africa are especially far behind, although a few have shown improvements.
- The vast majority of maternal and child deaths are preventable, but unacceptably large numbers of women, newborns and children are still dying each year in *Countdown* countries, where at least 95% of all maternal and child deaths occur. A growing proportion of child deaths occur in the first four weeks of life.
- Poorly functioning health infrastructure, inadequate numbers of health workers, slow adoption of evidence-based health policies and insufficient focus on quality of care are holding back progress in many countries.
- Skilled care at birth, including emergency care for mothers and newborns, is critical to achieving Millennium Development Goals 4 and 5: about 2 million lives a year are lost to complications occurring during labour and childbirth.
- Pneumonia and diarrhoea remain the largest killers of children after the newborn period. Undernutrition contributes to more than one-third of child deaths.
- Some *Countdown* countries are doing better at reaching the most disadvantaged women and children, but profound inequities in coverage and health outcomes—both between and within countries—must be confronted and overcome.
- Countries should aggressively pursue policies to make health services available and affordable for all, by making services free at the point of delivery and exploring innovative financing strategies.
- Funding is increasing for maternal and child health, but at too slow a pace, and funding for family planning has declined.
- Millennium Development Goals 4 and 5 are still achievable by 2015—but only a dramatic acceleration of political commitment and financial investment can make it happen.





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Abbreviations

BCG	Bacille Calmette-Guérin
DPT	diphtheria and tetanus with pertussis
GDP	gross domestic product
HIV/AIDS	human immunodeficiency virus/acquired immune deficiency syndrome
MDG	Millennium Development Goal
ODA	official development assistance
UNAIDS	Joint United Nations Programme on HIV/AIDS
UNFPA	United Nations Population Fund
UNICEF	United Nations Children's Fund
WHO	World Health Organization

Countdown headlines for 2010: saving the lives of the world's women, newborns and children



Survival status

Millennium Development Goal 4—reduce child mortality

- Good news: 19 of the 68 *Countdown* countries are on track to achieve Millennium Development Goal (MDG) 4.
 - 17 countries have reduced child mortality by at least half.
 - 47 countries have accelerated their progress on child mortality since 2000.
- Much work remains: 49 *Countdown* countries are not on track to achieve MDG4.
 - 12 countries (including some currently on track) have seen their progress slow since 2000.
- Death and illness:
 - Globally 8.8 million children a year die before their fifth birthday, more than 40% of them during their first four weeks of life. At least two-thirds of all child deaths are preventable.
 - Pneumonia and diarrhoea remain the largest killers of children after the newborn period.
 - Undernutrition contributes to more than 1 in 3 child deaths.

Millennium Development Goal 5—improve maternal health

- Good news: new studies suggest that some progress is being made on reducing maternal mortality.
- Much work remains: both globally and in most *Countdown* countries, progress is insufficient to achieve MDG 5, particularly in Sub-Saharan Africa. Urgent action is needed to scale up proven interventions to improve reproductive and maternal health.

- Death and illness:
 - An unacceptable number of women die in pregnancy and childbirth each year. For every woman who dies, at least 20 others suffer injuries, infection and disability. Almost all maternal deaths are preventable.
 - Most maternal deaths occur during childbirth and in the immediate postnatal period, which is also when most stillbirths and newborn deaths occur.
 - The leading cause of maternal deaths remains postpartum haemorrhage, largely preventable through skilled care during childbirth.

Coverage gains and gaps

- Progress is inconsistent: progress on coverage of lifesaving interventions across the continuum of care is uneven.
 - Some interventions delivered routinely through outreach or scheduled in advance (such as vaccinations and vitamin A supplementation) have achieved and sustained high coverage.
 - Interventions that must be provided in response to acute need (such as treatment of childhood illnesses and caesarean sections) show little progress.
 - Relatively new interventions that have received attention and resources, such as insecticide-treated nets and prevention of mother-to-child transmission of HIV, show rapid gains.
- Skilled care during childbirth: all women and newborns need access to a skilled attendant at birth, but overall coverage across the *Countdown* countries remains insufficient and uneven.
 - 10 countries showed coverage gains of more than 10 percentage points since 1990, and 3 countries—Burkina Faso,

Pakistan and Rwanda—had gains of more than 20 percentage points from around 2000 to around 2008.

- 11 countries have shown no progress in coverage since 1990.
- Family planning: wide disparities in coverage of family planning services across and within countries represent a missed opportunity to improve the health of women and young children.
- More information is needed: higher coverage is critical, but saving lives also depends on the quality of care. More information is needed on what care is actually provided during antenatal, childbirth and postnatal contacts.

Health systems and policies

- Health workers: 53 of the 68 *Countdown* countries are experiencing acute shortages of doctors, nurses and midwives. Overcoming these shortages and addressing the unequal distribution of health workers within countries require focused investment in training, deployment and retention.
- Financial barriers to access: the high proportion of health service costs paid out of pocket in nearly all *Countdown* countries puts families at risk of financial catastrophe. Making services free at the point of delivery helps increase utilization: financing mechanisms such as pre-payment and risk pooling can help make health services available and affordable for all.
- Improving access and quality of care: investment in health information and referral systems, equipment, medical supplies and infrastructure is critical to improving access to and quality of maternal, newborn and child health services.
- Adoption of policies: evidence-based policies can save and improve women's and children's lives. Bangladesh and Nepal, for example, have shown that implementing policies to increase access to diarrhoea and pneumonia treatment in the community reduces child deaths. More progress is needed: the number of *Countdown* countries that have adopted

recommended policies for increasing access to quality care is still too low.

Closing the equity gap

- Inequities in access: coverage rates are substantially higher among women and children in better-off families than in poor families.
- The poor and excluded: high national coverage levels do not always indicate progress in reaching the poorest and most vulnerable women and children. Guatemala and Zambia, for example, have similar levels of overall coverage for a subset of proven maternal, newborn and child health interventions, but more women and children from the poorest families receive these services in Zambia than in Guatemala.
- Further research needed: countries with smaller gaps between rich and poor—including Bangladesh, Brazil, Egypt, Swaziland and Zambia—may provide models for reducing inequities through greater political commitment, specific targeting of low-income groups, redirecting of human resources and other strategies.
- Service provision: disparities are larger for services provided in health facilities (such as delivery care) than for those delivered at the community level (such as vaccines).

Closing the funding gap

- Financing the gap: preliminary estimates show that considerable additional funding and greater political commitment to maternal, newborn and child health are needed to achieve universal coverage of the full package of interventions in the 68 *Countdown* countries.
- Official development assistance (ODA):
 - ODA for maternal, newborn and child health increased between 2003 and 2007 but remains far below needed levels. Only 31% of all ODA for health was allocated to maternal, newborn and child health in 2007. Family planning received less funding in 2007 than in 2003.
 - ODA is not always targeted to countries with the greatest need. Achieving

MDGs 4 and 5 will require donors to improve their funding and allocation practices.

- National resources: although ODA is important, national resources are a much larger share of maternal, newborn and child health funding. Tracking government and nongovernment spending at the country level is essential so that policy-makers can allocate adequate resources for women's and children's health.

Action now

- All countries should:
 - Identify gaps in coverage and quality of care along the continuum of care for maternal, newborn and child health.
 - Improve the delivery of essential interventions and packages.
 - Identify inequities in coverage—by geographic area, ethnic group, income and the like—and initiate actions to provide universal coverage of essential interventions and packages.
 - Increase resource allocations for reproductive, maternal, newborn and

child health services, ensuring that interventions and programmes are sufficiently funded.

- Other *Countdown* partners should work together with countries to:
 - Advocate for increased funding for reproductive, maternal, newborn and child health through innovative mechanisms and ensure that funding is predictable, consistent and responsive to national needs and plans.
 - Support country efforts to improve data collection and analysis by strengthening health information and vital registration systems as well as by undertaking additional surveys to measure mortality, coverage and funding.
 - Invest in implementation research to identify effective strategies for delivering proven interventions and quantify their impact.
 - Maximize financial and technical support for large-scale implementation of priority strategies and interventions.
 - Encourage the development and use of mechanisms for holding key actors accountable for fulfilling their commitments.





About *Countdown to 2015*



Countdown to 2015: Tracking Progress in Maternal, Newborn and Child Survival

- is a global movement of academics, governments, international agencies, health care professional associations, donors and nongovernmental organizations, with *The Lancet* as a key partner.
- uses country-specific data to stimulate and support country progress towards achieving the health-related MDGs.
- focuses on coverage of effective interventions for maternal, newborn and child health and coverage determinants, including health systems and policies, financial flows and equity.

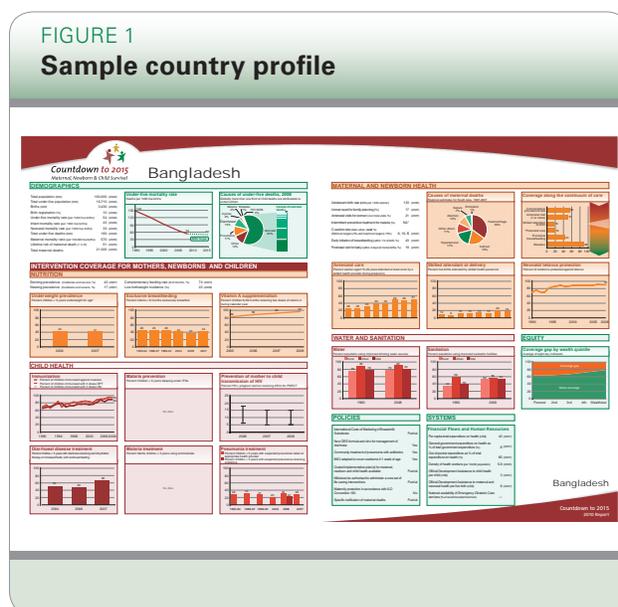
Countdown addresses multiple MDGs:

- MDG 4 to reduce child mortality.
- MDG 5 to improve maternal health.
- MDG 1 to eradicate extreme poverty and hunger, specifically by addressing nutrition with a focus on infant and young child feeding.
- MDG 6 to combat HIV/AIDS, malaria and other diseases.
- MDG 7 to ensure environmental sustainability, through tracking improved access to safe water and improved sanitation.

Countdown tracks progress in the 68 countries where more than 95% of all maternal and child deaths occur (map 1).

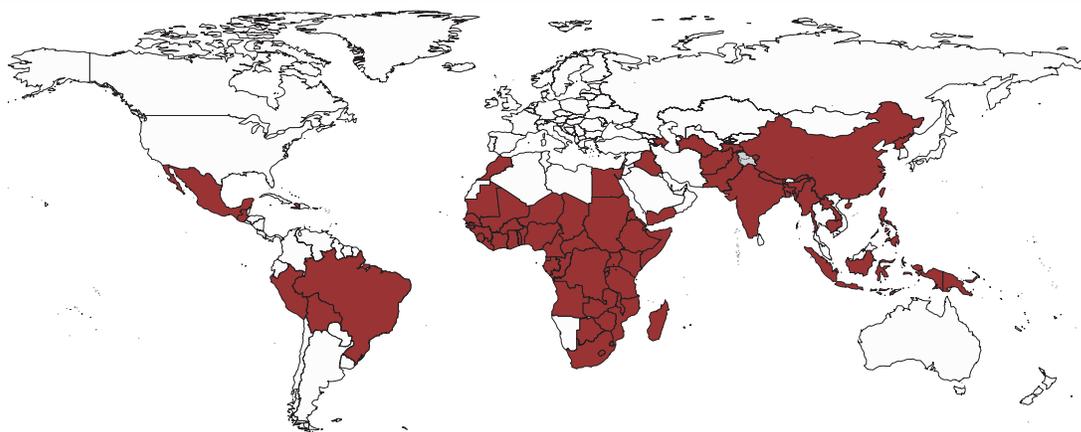
Countdown focuses on countries (figure 1).

FIGURE 1
Sample country profile



MAP 1

The 68 Countdown Priority countries



Source: Authors' compilation based on information supplied in text.

A key element of *Countdown* work is country profiles that bring together information on coverage levels for interventions proven to improve maternal, newborn and child health as

well as relevant demographic, epidemiological, policy, health systems and financing indicators (box 1). The profiles are updated every two to three years with new data and estimates.

BOX 1

Countdown: the best evidence to inform the right decisions

Scope of Countdown work

Countdown focuses on four areas, each addressed by an interdisciplinary technical working group:

- *Coverage* for interventions proven effective in reducing maternal, newborn and child deaths. Coverage is defined as the proportion of the population who can benefit from an intervention who receives it.
- *Health systems and policies*, which provide an important context for coverage gains.
- *Financial flows to maternal, newborn and child health*, initially focused on ODA and now including national financing.
- *Equity* in intervention coverage, focused on the equitable distribution of coverage across socioeconomic quintiles in national populations.

Countdown recognizes the broader set of political, economic, social, technological and environmental determinants of coverage and mortality and incorporates them into analyses where relevant and feasible given available data.

Data sources and methods

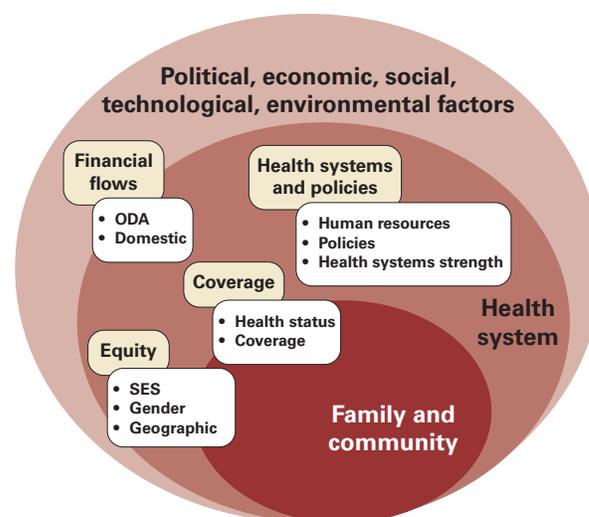
The 2008 *Countdown* report describes how the priority *Countdown* countries were identified, the selection of interventions and approaches tracked through *Countdown*, and the coverage indicators associated with each. A full list of *Countdown* indicators and data sources as well as documentation on the methods used to calculate the equity measures, financing gap analysis and ODA estimates is available at <http://www.countdown2015mnch.org>.

Data quality control

Quality control of the coverage estimates for interventions and approaches effective in reducing maternal, newborn and child mortality is the responsibility of many different groups. *Countdown* supplements these efforts by working closely with the United Nations Children's Fund (UNICEF) and others

responsible for maintaining global databases and conducts additional quality checks to ensure consistency and reliability. Country profiles are shared with ministries of health and UN colleagues prior to publication. Work is under way to address continuing challenges in estimating coverage and associated uncertainty.

Countdown databases within the broader context of maternal, newborn and child survival



New Countdown results expected in 2011

This update reports on data for *Countdown* indicators available as of December 2009. A full *Countdown* report will be released in 2011 and will include:

- Updated estimates for maternal mortality.
- New coverage estimates for many countries drawing on recent national surveys.
- First results from in-depth analyses conducted by all technical working groups.
- Findings from cross-cutting analyses addressing priority questions.
- New ODA estimates for maternal, newborn and child health for 2008, financing for family planning, and domestic spending on maternal, newborn and child health for African and Asian *Countdown* countries.

Progress towards Millennium Development Goals 4 and 5

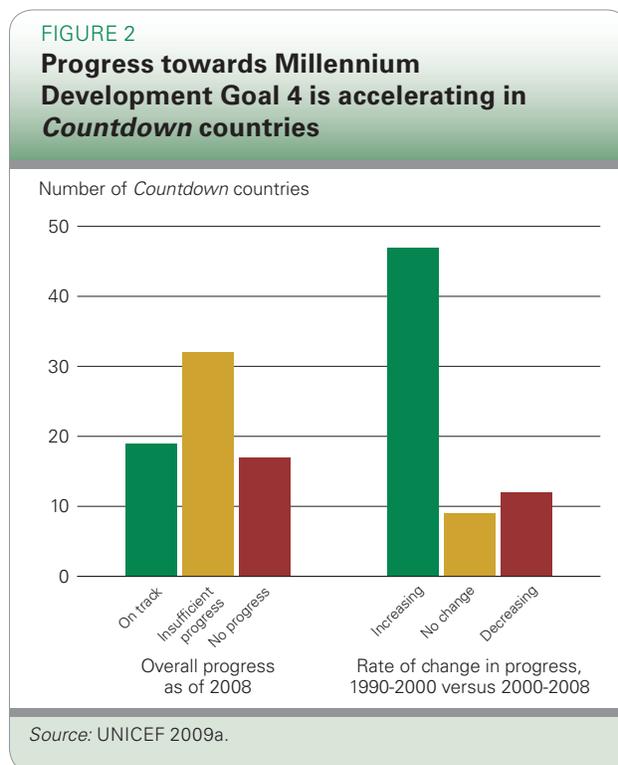


Progress towards MDGs 4 and 5 is inextricably linked: improving maternal health will lead directly to reductions in deaths among newborns and young children. There are also shared challenges in improving health services across the continuum from pre-pregnancy through pregnancy, childbirth, the postnatal period, and childhood. This section focuses on trends in mortality; later sections look more in depth at intervention coverage and the related areas of health systems, financial flows and equity.

Good news! There has been huge progress in reducing deaths among children under age 5 worldwide.¹ And yet the opportunity to save children's lives has never been greater. Of the unacceptable burden of nearly 9 million deaths of children under age 5 that occur a year, at least two-thirds of them could be prevented using proven, affordable interventions.² Table 1 shows country-specific progress towards MDG 4, including the estimated under-five mortality rates for 1990, 2000 and 2008, the average annual rate of reduction for 1990–2008 and its trend for 1990–2000 and 2000–2008, and a summary assessment of progress.

Of the 68 *Countdown* countries, 19 are on track to achieve MDG 4 (figure 2), and 17 of those have reduced mortality by at least half. In 47 *Countdown* countries the rate of change in progress over 2000–2008 increased compared with the 1990s. The annual average rate of reduction rose more than 4 percentage points in Azerbaijan, Botswana, China, Ghana, Lesotho, Rwanda and Swaziland. However, further absolute gains are needed to achieve the goal, except in Azerbaijan and Botswana, two countries that are on track.

Much remains to be done. In 12 countries progress has slowed since 2000; some are on track now but may not be if these trends continue (including Guatemala, Indonesia and



the Philippines). National governments and their development partners must stay committed to child survival to prevent reversals in progress and because further gains are harder to achieve as mortality rates fall.

Mortality is not being reduced uniformly. Just over 40% of child deaths now occur in the first month of life. The growing concentration of child deaths in the newborn period is linked to maternal health and survival (box 2). Hundreds of thousands of women die each year because of complications related to pregnancy and childbirth. For every woman who dies, approximately 20 others suffer injuries, infection and disabilities, resulting in millions of women experiencing adverse pregnancy outcomes.

TABLE 1

Country progress towards Millennium Development Goal 4

Country or territory	Under-five mortality rate (per 1,000)			Average annual rate of reduction (%)	Summary assessment of progress ^a	Average annual rate of reduction (%)		Direction of change
	1990	2000	2008	1990–2008		1990–2000	2000–2008	
Afghanistan	260	257	257	0.1	No progress	0.1	0.0	↓
Angola	260	239	220	0.9	No progress	0.8	1.0	↑
Azerbaijan	98	69	36	5.6	On track	3.5	8.1	↑
Bangladesh	149	91	54	5.6	On track	4.9	6.5	↑
Benin	184	144	121	2.3	Insufficient progress	2.5	2.2	↓
Bolivia	122	86	54	4.5	On track	3.5	5.8	↑
Botswana	50	81	31	2.7	On track	-4.8	12.0	↑
Brazil	56	34	22	5.2	On track	5.0	5.4	↑
Burkina Faso	201	188	169	1.0	Insufficient progress	0.7	1.3	↑
Burundi	189	178	168	0.7	No progress	0.6	0.7	↑
Cambodia	117	106	90	1.5	Insufficient progress	1.0	2.0	↑
Cameroon	149	147	131	0.7	No progress	0.1	1.4	↑
Central African Republic	178	181	173	0.2	No progress	-0.2	0.6	↑
Chad	201	205	209	-0.2	No progress	-0.2	-0.2	—
China	46	36	21	4.4	On track	2.5	6.7	↑
Congo	104	116	127	-1.1	No progress	-1.1	-1.1	—
Congo, Dem. Rep. of the	199	199	199	0.0	No progress	0.0	0.0	—
Côte d'Ivoire	150	138	114	1.5	Insufficient progress	0.8	2.4	↑
Djibouti	123	106	95	1.4	Insufficient progress	1.5	1.4	↓
Egypt	90	47	23	7.6	On track	6.5	8.9	↑
Equatorial Guinea	198	168	148	1.6	Insufficient progress	1.6	1.6	—
Eritrea	150	89	58	5.3	On track	5.2	5.4	↑
Ethiopia	210	148	109	3.6	Insufficient progress	3.5	3.8	↑
Gabon	92	87	77	1.0	Insufficient progress	0.6	1.5	↑
Gambia	153	131	106	2.0	Insufficient progress	1.6	2.6	↑
Ghana	118	111	76	2.4	Insufficient progress	0.6	4.7	↑
Guatemala	77	47	35	4.4	On track	4.9	3.7	↓
Guinea	231	185	146	2.5	Insufficient progress	2.2	3.0	↑
Guinea-Bissau	240	218	195	1.2	Insufficient progress	1.0	1.4	↑
Haiti	151	109	72	4.1	On track	3.3	5.2	↑
India	116	94	69	2.9	Insufficient progress	2.1	3.9	↑
Indonesia	86	56	41	4.1	On track	4.3	3.9	↓
Iraq	53	48	44	1.0	Insufficient progress	1.0	1.1	↑
Kenya	105	128	128	-1.1	No progress	-2.0	0.0	↑
Korea, Dem. Rep.	55	55	55	0.0	No progress	0.0	0.0	—
Lao People's Democratic Republic	157	86	61	5.3	On track	6.0	4.3	↓
Lesotho	101	109	79	1.4	Insufficient progress	-0.8	4.0	↑
Liberia	219	174	145	2.3	Insufficient progress	2.3	2.3	—
Madagascar	167	132	106	2.5	Insufficient progress	2.4	2.7	↑
Malawi	225	162	100	4.5	On track	3.3	6.0	↑
Mali	250	217	194	1.4	Insufficient progress	1.4	1.4	—
Mauritania	129	122	118	0.5	No progress	0.6	0.4	↓
Mexico	45	26	17	5.4	On track	5.5	5.3	↓
Morocco	88	54	36	5.0	On track	4.9	5.1	↑
Mozambique	249	183	130	3.6	Insufficient progress	3.1	4.3	↑
Myanmar	120	107	98	1.1	Insufficient progress	1.1	1.1	—
Nepal	142	85	51	5.7	On track	5.1	6.4	↑
Niger	305	227	167	3.3	Insufficient progress	3.0	3.8	↑
Nigeria	230	207	186	1.2	Insufficient progress	1.1	1.3	↑

(continued)

TABLE 1 (continued)

Country progress towards Millennium Development Goal 4

Country or territory	Under-five mortality rate (per 1,000)			Average annual rate of reduction (%)	Summary assessment of progress ^a	Average annual rate of reduction (%)		
	1990	2000	2008	1990–2008		1990–2000	2000–2008	Direction of change
Pakistan	130	108	89	2.1	Insufficient progress	1.9	2.4	↑
Papua New Guinea	91	77	69	1.5	Insufficient progress	1.7	1.4	↓
Peru	81	41	24	6.8	On track	6.8	6.7	↓
Philippines	61	36	32	3.6	On track	5.3	1.5	↓
Rwanda	174	186	112	2.4	Insufficient progress	−0.7	6.3	↑
Senegal	149	131	108	1.8	Insufficient progress	1.3	2.4	↑
Sierra Leone	278	252	194	2.0	Insufficient progress	1.0	3.3	↑
Somalia	200	200	200	0.0	No progress	0.0	0.0	—
South Africa	56	73	67	−1.0	No progress	−2.7	1.1	↑
Sudan	124	115	109	0.7	No progress	0.8	0.7	↓
Swaziland	84	124	83	0.1	No progress	−3.9	5.0	↑
Tajikistan	117	94	64	3.4	Insufficient progress	2.2	4.8	↑
Tanzania, U. Rep.	157	139	104	2.3	Insufficient progress	1.2	3.6	↑
Togo	150	122	98	2.4	Insufficient progress	2.1	2.7	↑
Turkmenistan	99	71	48	4.0	On track	3.3	4.9	↑
Uganda	186	158	135	1.8	Insufficient progress	1.6	2.0	↑
Yemen	127	98	69	3.4	Insufficient progress	2.6	4.4	↑
Zambia	172	169	148	0.8	No progress	0.2	1.7	↑
Zimbabwe	79	102	96	−1.1	No progress	−2.6	0.8	↑

a. "On track" indicates that the under-five mortality rate for 2008 is less than 40 per 1,000 or that it is 40 or more with an average annual rate of reduction of 4% or higher for 1990–2008; "insufficient progress" indicates that the under-five mortality rate for 2008 is 40 or more with an average annual rate of reduction of 1%–3.9% for 1990–2008; "no progress" indicates that the under-five mortality rate for 2008 is 40 or more with an average annual rate of reduction of less than 1% for 1990–2008.

Source: Mortality rates, Inter-agency Group for Child Mortality Estimation, 2009, www.childmortality.org; average annual rate of reduction and summary of progress, UNICEF 2009a.



New data and continuing challenges in achieving MDG 5 and improving the lives of women

The maternal mortality ratio, the number of maternal deaths per 100,000 live births, is the most common measure of the magnitude of maternal mortality and is a progress indicator for MDG target 5.A, which aims at reducing the ratio by three quarters over 1990–2015, implying an average annual rate of reduction of 5.5%.

New global and regional maternal mortality estimates were set to be released after this *Countdown* update went to press. Updated country estimates will be available in fall 2010 after extensive in-country consultation.

The work on regular updating of the estimates reflects the international community's commitment to continuously improve assessment of the maternal mortality burden but also highlights the urgent need to invest in building country health information systems to monitor maternal mortality. The World Health Organization (WHO), UNICEF, the United Nations Population Fund (UNFPA) and the World Bank work closely with the United Nations Population Division, academic experts and countries to regularly update global, regional and country estimates of maternal mortality. There are preliminary indications of global progress, with some countries having achieved significant declines.¹ A recent academic analysis using alternative statistical assumptions found an annual rate of reduction of 1.3% over 1990–2008,² well short of the 5.5% needed to attain the MDG target.

Measuring maternal mortality remains a challenge. Identifying a maternal death requires accurate data on the deaths of women of reproductive age, including cause of death, pregnancy status and the time of death in relation to pregnancy or childbirth. These data are often missing, misclassified or underreported, particularly in low- and middle-income countries that lack fully functioning vital registration systems and where many women deliver at home. Early pregnancy deaths are especially difficult to identify. The weakness of many developing country health information systems

results in the use of statistical modelling to develop maternal mortality estimates, which better indicate the order of magnitude of the problem. These estimates are subject to considerable uncertainty and vary with the assumptions and methods used. Important limitations of the maternal mortality ratio include:

- The maternal mortality ratio reflects only the risk of death once pregnant and misses the cumulative mortality risk associated with the number of pregnancies a woman has during her reproductive years.
- The maternal mortality ratio is difficult to measure, has large uncertainty bounds and must be interpreted cautiously—hence the need for real-time monitoring and surveillance of maternal deaths.
- The maternal mortality ratio focuses narrowly on mortality and may result in a lack of attention to the millions of women who suffer from “near-miss” events and short- and long-term pregnancy-related illnesses.³

Preventing maternal mortality and the millions of pregnancy-related disabilities each year will require concentrated efforts to improve coverage of comprehensive family planning programmes and antenatal, childbirth, emergency obstetric and postnatal care—all indicators tracked in *Countdown*. Improving access to safe abortion care in countries where abortion is legal is also essential for reducing maternal deaths. Coverage of a skilled attendant at birth is a progress indicator for MDG target 5.A and is a sensitive measure of health system strength. Over the past two decades coverage of a skilled attendant at birth has improved in all regions, with considerable gains in North Africa and South-East Asia (see figure 10).⁴

Notes

1. WHO, UNICEF, UNFPA, and World Bank 2007.
2. Hogan and others 2010.
3. Filippi 2006.
4. UNICEF global databases, November 2009.

Causes of maternal and child deaths



What causes the 8.8 million child deaths each year?

New estimates of child deaths for 2008 show that pneumonia, diarrhoea and malaria remain the highest causes worldwide, together accounting for 41% of deaths (figure 3). More than 40% of child deaths occur in the neonatal period, and progress in reducing deaths has been slower for newborn deaths than for deaths among children ages one month to five years. Undernutrition contributes to more than one-third of child deaths.³ The majority of these deaths can and must be prevented by increasing coverage for known, affordable and effective interventions.

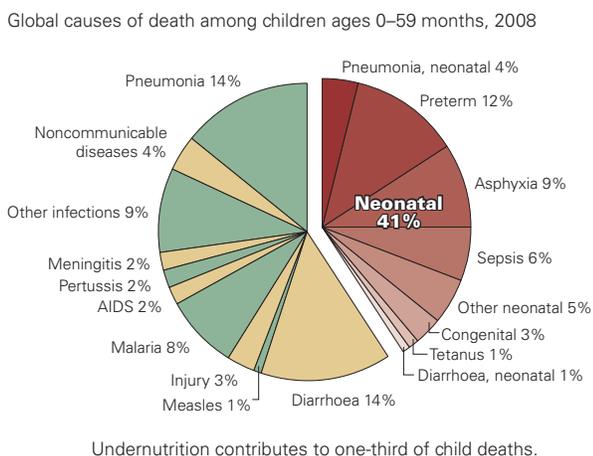
The country profiles highlight important regional and country variations in these causes. For example, estimates for Africa indicate that 29% of all child deaths occur in the neonatal period and that 49% of deaths after this period are due to pneumonia, diarrhoea or malaria.⁴ In contrast, estimates for South East Asia indicate that about

54% of child deaths occur in the neonatal period and that about 26% of postneonatal deaths are due to pneumonia, diarrhoea or malaria.

Global distribution of maternal causes of death

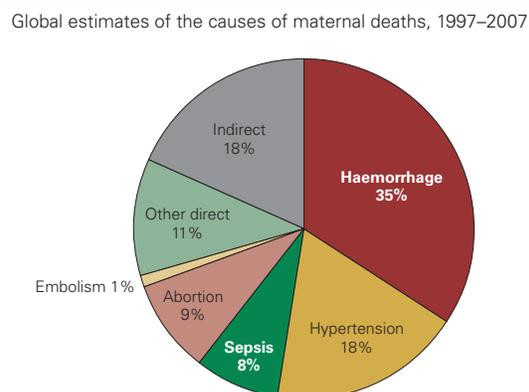
A maternal death is defined as the death of a woman while pregnant or within 42 days of termination of pregnancy, regardless of the site or duration of pregnancy, from any cause related to or aggravated by the pregnancy or its management. New estimates show that the leading causes of maternal deaths are haemorrhage and hypertension, which together account for more than half of maternal deaths (figure 4). Indirect causes, which include deaths due to conditions such as malaria, HIV/AIDS and cardiac diseases, account for about one-fifth of maternal deaths. Regional estimates show that haemorrhage and hypertension are among the top three causes of deaths in both South Asia and Sub-Saharan Africa, where the

FIGURE 3
More than 40% of child deaths occur during the neonatal period



Source: Black and others forthcoming.

FIGURE 4
New estimates show that haemorrhage and hypertension account for more than half of maternal deaths



Source: Preliminary data from a WHO systematic review of causes of maternal deaths.

majority of maternal deaths occur. This is in contrast to developed countries, where other direct causes—for example, those related to complications of anaesthesia and caesarean sections—are the leading cause of death, reflecting global disparities in access to needed obstetrical care.

The categories of maternal deaths are based on a new classification system developed by WHO that considers obstructed labour and anaemia to be contributing conditions rather than direct causes. Deaths related to these two conditions are now classified within the categories of haemorrhage or sepsis.



Social determinants of maternal, newborn and child health



In the words of the WHO Commission for Social Determinants of Health (2008), social determinants of maternal, newborn and child health “. . . are the conditions in which people are born, grow, live, work and age, including the health system. These circumstances are shaped by the distribution of money, power and resources at global, national and local levels, which are themselves influenced by policy choices. The social determinants of health are mostly responsible for health inequities—the unfair and avoidable differences in health status seen within and between countries.”

Poverty and inequity are underlying contributors to many maternal, newborn and child deaths, and evidence shows that poor households have more than twice the risk of mortality of wealthy households.⁵ Poverty affects maternal, newborn and child health through a range of mechanisms. Poor diets and food insecurity increase the risk of illness and undernutrition (box 3); poor environmental conditions contribute to inadequate housing, water and sanitation; and family poverty reduces care-seeking and access to information and health care services. Poverty and lack of access to care can be compounded by conflict,

BOX 3

Undernutrition: a risk for women and children

Undernutrition affects mortality and ill-health along the entire continuum of care from pre-pregnancy to early childhood.

Undernutrition, the result of poor dietary quality and inadequate intake of micronutrients as well as low energy intake, contributes to at least one-third of child deaths. Stunting, or low height for age, is a particularly important *Countdown* indicator because it reflects longer term nutritional deficiencies with implications for growth and development of children now and in future generations. Child undernutrition and infectious diseases are synergistic and cyclical, posing a major threat to child survival.

Maternal short stature and iron deficiency anaemia, which can increase the risk of death of the mother at delivery, contribute to at least 20% of maternal deaths. Maternal undernutrition also increases the probability of low birth weight, which in turn increases the probability of neonatal deaths due to infections and asphyxia. Measures of maternal undernutrition will be tracked by *Countdown* beginning in the 2011 report.

Two-thirds of the world's children affected by stunting live in just 10 *Countdown* countries

Country	Stunting prevalence (%)	Number of stunted children (thousands)	Share of developing country total (%)
India	48	60,788	31.2
China	22	12,685	6.5
Nigeria	41	10,158	5.2
Pakistan	42	9,868	5.1
Indonesia	37	7,688	3.9
Bangladesh	43	7,219	3.7
Ethiopia	51	6,768	3.5
Congo, Dem. Rep. of the	46	5,382	2.8
Philippines	34	6,317	1.9
Tanzania, U. Rep.	44	3,359	1.7
Total			65.5

Source: UNICEF 2009b.

Source: Stewart, Dewey, and Ashorn 2010; Victora and others 2008; Black and others 2008; UNICEF 2009b.

population displacement and emergencies such as floods and drought. Recent analyses indicate that maternal, newborn and child health can be negatively affected by high burdens of noncommunicable diseases that increase the likelihood of catastrophic expenditures at the household level. Maternal, newborn and child health is also influenced by gender discrimination, low levels of female education, few income-earning opportunities for women and other societal factors affecting women's empowerment. Further, the death of a mother increases the risk that her children will die.

A range of measures are available to address social determinants of health. Expanding educational programmes, introducing gender-based affirmative action policies and other programmes to achieve MDG3, implementing laws supportive

of human rights and improving living and working conditions (for example, improving access to clean water and adequate sanitation) can all make a difference. Good governance and oversight of health systems can positively influence maternal, newborn and child health in difficult circumstances. In addition, tackling the inequitable distribution of power, money and resources should be a priority. Other successful approaches include addressing financial barriers to care by, for example, reducing or eliminating user fees or introducing targeted conditional cash transfer schemes. Women's support groups have been shown to contribute measurable improvements in maternal, newborn and child health as well as mental health, suggesting that such strategies can be employed synergistically with health sector reforms to improve women's empowerment and decision-making.



Coverage along the continuum of care



Countdown tracks coverage along a continuum of care from pre-pregnancy and childbirth through childhood up to age 5, highlighting missed opportunities for the delivery of lifesaving interventions. Median coverage levels for 20 *Countdown* interventions are summarized in figure 5 but they mask important variations in levels and progress at the country level.

Coverage gaps

The 2010 *Countdown* results show important gaps in coverage for three groups of interventions:

- Interventions immediately surrounding birth, such as the presence of a skilled attendant, ensuring the early initiation of breastfeeding and

an early postnatal visit to check on the health of the mother and newborn.

- Interventions that require 24-hour access to a skilled health provider, such as treatment of childhood pneumonia, diarrhoea and malaria.
- Interventions introduced only recently, such as intermittent preventive treatment for malaria during pregnancy, or recently scaled-up interventions, such as the use of insecticide-treated nets.

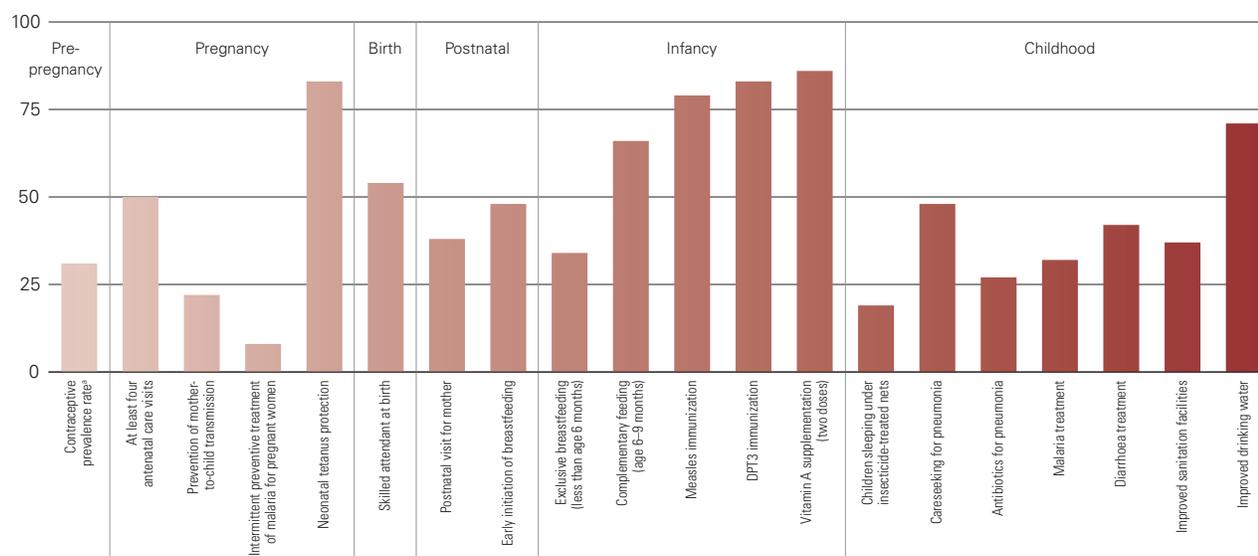
Equity gaps

Data on the disparities in coverage between the poorest and the least-poor, shown later, highlight the poor-rich gap in access to these essential

FIGURE 5

Coverage of interventions varies across the continuum of care

Median national coverage of interventions across the continuum of care for 20 *Countdown* interventions and approaches in *Countdown* countries, most recent year since 2000 (%)



a. Target coverage value is not 100%.

Source: Prevention of mother-to-child transmission of HIV/AIDS, UNICEF, Joint United Nations Programme on HIV/AIDS (UNAIDS) and WHO; immunization rates, WHO and UNICEF; postnatal visit for mother, Saving Newborn Lives analysis of Demographic and Health Surveys; improved water and sanitation, WHO and UNICEF Joint Monitoring Programme 2010; all other indicators, UNICEF Global Databases, November 2009, based on Demographic and Health Surveys, Multiple Indicator Cluster Surveys and other national surveys.

lifesaving interventions, including family planning services.

Quality gaps

Coverage estimates for service delivery contacts—such as antenatal care, skilled attendant at birth and postnatal visits for the mother—do not address the quality of that contact or whether it provided needed interventions such as active management of the third stage of labour or counselling on family planning. Quality assessments of such

services are an essential part of sound programme management.

Data gaps

Countdown highlights data gaps that must be addressed to improve the ability of countries to make informed decisions on how to accelerate progress towards MDGs 4 and 5. For example, only 23 *Countdown* countries have data available on postnatal care for women, and six have data on postnatal care for newborns.





Every pregnancy wanted

Addressing adolescent reproductive health— an essential part of the continuum of care

Newly included in this *Countdown* update are estimates of the adolescent birth rate, defined as the annual number of births to women ages 15–19 per 1,000 women in that age group. This is a progress indicator for MDG target 5.B for achieving universal access to reproductive health. Adolescent fertility is high in many *Countdown* countries (figure 6), which means that many young women face an elevated risk of maternal death and disability. Newborns and infants of adolescent mothers are also at higher risk of low birth weight and mortality.

Analysis of 23 *Countdown* countries in Sub-Saharan Africa with two consecutive Demographic and Health Surveys since 2000 shows at least a 10% drop in the adolescent fertility rate in 18 of them. In the majority of these countries, the declines are primarily among women from wealthier households, those living in urban areas and those with higher education levels.

Increasing access to family planning

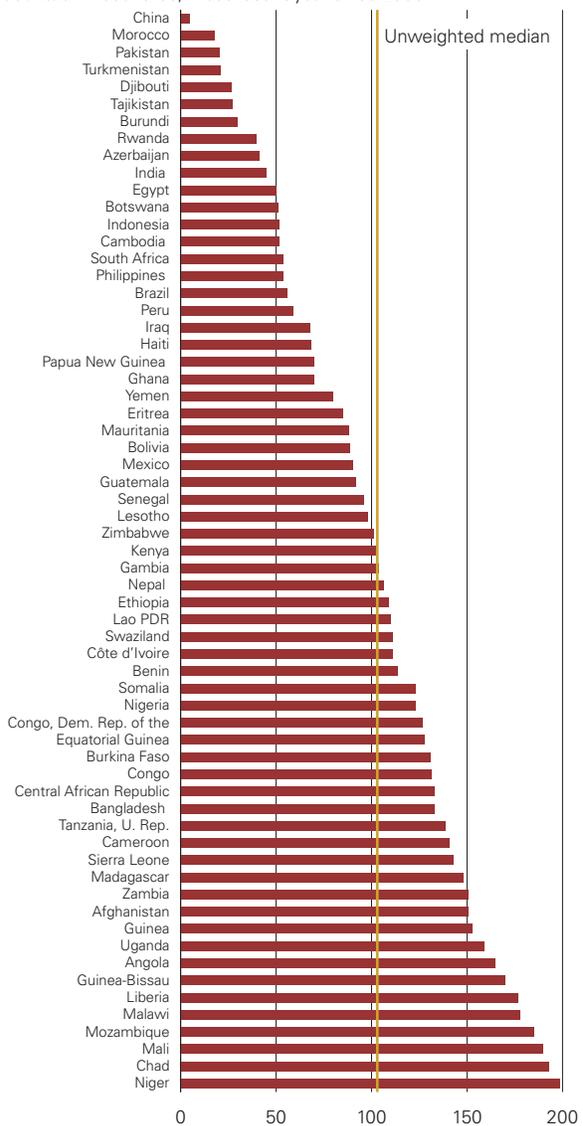
Reducing unwanted pregnancies reduces overall births, including those among adolescent women, and therefore reduces maternal deaths and unsafe abortions. The impact of birth spacing on newborn and child survival is also important.⁶ *Countdown* tracks both the contraceptive prevalence rate—the percentage of women married or in union ages 15–49 who are practising, or whose sexual partners are practising, any form of contraception—and the unmet need for contraception—the percentage of married women who do not want a child or who want to postpone their next pregnancy but are not using any contraception (figure 7). Both are progress indicators for MDG target 5.B.

Trends in family planning coverage have been highly variable across countries. The small increase in the median coverage for the 42 countries with data on contraceptive prevalence from around 2000

FIGURE 6

Births to adolescent girls carry risks for mothers and newborns

Annual number of births to women ages 15–19 per 1,000, *Countdown* countries, most recent year since 2000

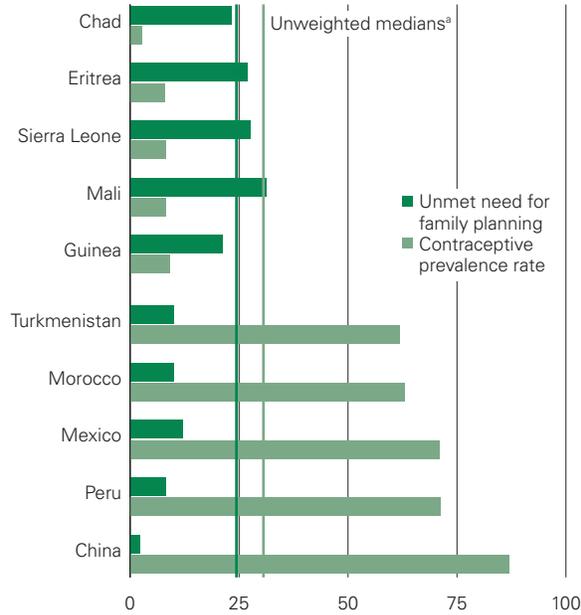


Source: United Nations Population Division.

FIGURE 7

Disparities in family planning coverage and need are wide

Unmet need for family planning, *Countdown* countries with the highest and lowest contraceptive prevalence rates, various years since 2000 (%)

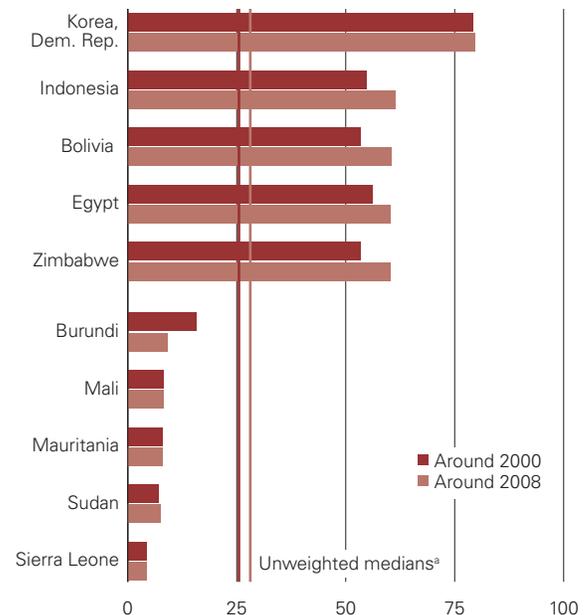


a. Refers to unweighted median of all *Countdown* countries with data available (49 countries for family planning and 66 countries for contraceptive prevalence rate).
 Source: Demographic and Health Surveys, Multiple Indicator Cluster Surveys and other national household surveys.

FIGURE 8

Progress in coverage for family planning since 2000 has been mixed

Coverage for family planning, contraceptive prevalence rate and trends for *Countdown* countries with the highest and lowest contraceptive prevalence rates; 2008 (%)



a. Refers to unweighted median of 42 *Countdown* countries with data available for both time periods.
 Source: Demographic and Health Surveys, Multiple Indicator Cluster Surveys and other national household surveys.

and around 2008 mask important increases and lack of progress in individual countries (figure 8). For example, Madagascar (box 4), Rwanda and Swaziland all increased coverage by more than 20 percentage points, but 12 other countries showed no change or a decrease in coverage, with Central African Republic and Togo seeing declines of

9 percentage points and Democratic Republic of Congo a decline of 11 percentage points. Decreased ODA to family planning from 1990 to 2007, among other factors, likely contributed to this lack of progress (see figure 22). There are also disparities in family planning coverage within countries, with lower coverage among women in poorer households and among adolescents relative to older women.



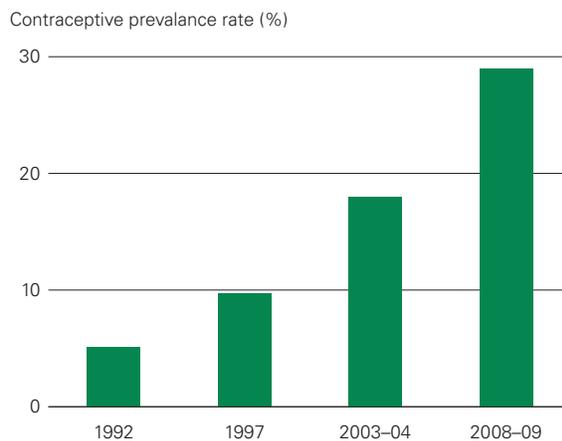
BOX 4

What can we learn from Madagascar's family planning success?

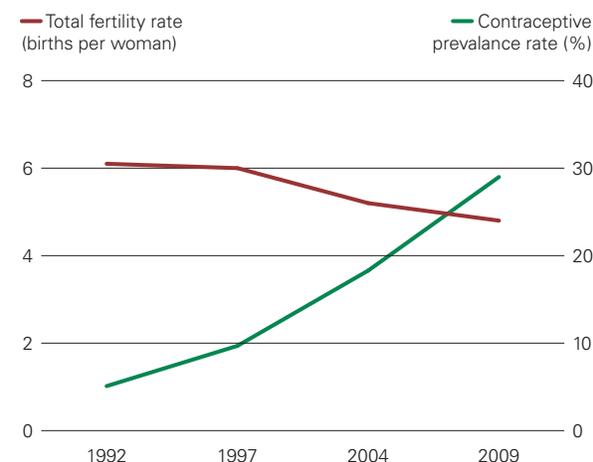
Contraceptive prevalence in Madagascar rose from 5.1% in 1992 to 29% in 2008–09, according to Demographic and Health Surveys (see figures). The Madagascar Family Planning Program attributes this success to three aspects of the programme:

- Leadership and policy
 - Strong leadership at the highest level (such as former President Marc Ravalomanana).
 - A target included at the highest level in the national development plan (Madagascar Action Plan target of 30% contraceptive prevalence in 2012).
 - Policy of providing contraceptives free in all public health facilities.
- Community involvement
 - Effective multisectoral collaboration with involvement of local authorities (17,433 Fokontany chiefs initiated and sensitized on family planning through a film and brochures).
 - National campaign of integrated activities for family planning, adolescent reproductive health and HIV/AIDS in 81% of public schools.
 - 3,000 women leaders initiated and sensitized on family planning.
 - Community health workers trained to provide family planning via injectable contraceptives.
- Programme management
 - Integration of family planning programme in all functional public health facilities, including 50 voluntary counselling and testing centres (all public and functional).
 - Family planning commodity security assured through coordination by a logistic committee, monitoring and periodic surveys.

The prevalence of modern contraception among married women in Madagascar has risen consistently since 1992



The number of women using family planning has accelerated since 1992



Source: Demographic and Health Surveys.



Every birth safe

All women and their newborns need skilled care at birth and access to emergency care when complications develop. Outcomes around birth are a sensitive marker of the strength of health systems, including the quality of available care (figure 9). Life-threatening complications at birth require rapid response. Postpartum haemorrhage can kill a mother in a few hours, and a newborn who is not breathing at birth will be dead within minutes.

Addressing current global gaps for care at birth is critical to achieving MDGs 4 and 5. When mothers die during childbirth, it is rare for the newborn to survive, and the risk of mortality increases for any young children left behind in the household.

Coverage gap for care at birth

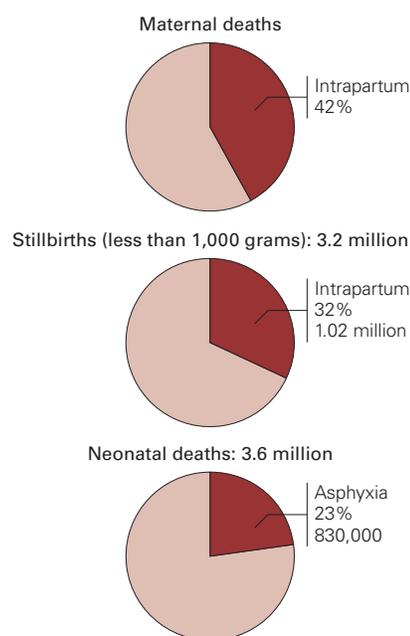
Some *Countdown* countries have made good progress in increasing the proportion of women attended by a skilled provider during childbirth, a progress indicator for MDG target 5.A. Three countries—Burkina Faso, Pakistan and Rwanda—had gains of more than 20 percentage points from around 2000 to around 2008, and 10 had gains of more than 10 percentage points since 1990 (figure 10). Gains were uneven, however, with 11 countries showing no progress. More effort is needed to ensure all pregnant women and newborns have access to a skilled provider.

Coverage gap for emergency obstetric care

Life-threatening complications during labour and delivery are often unpredictable and unpreventable. All pregnant women must have access to skilled care at birth (box 5) and a guarantee that basic or emergency obstetric care services are accessible when needed. Availability of such services is low in many *Countdown* countries (see page 29). Caesarean section coverage rates below 5% signal a lack of access to emergency obstetric care and indicate human resources and other health systems challenges⁷; 33 of the 51 *Countdown* countries with data since 2000 had rural rates below 5%, and 4—Burkina Faso, Chad, Ethiopia and Niger—had rural rates below 1%.

FIGURE 9

The period surrounding birth accounts for a high proportion of deaths



Source: Adapted from Lawn and others (2009) using data on stillbirths from Stanton and others (2006), data on intrapartum stillbirths from Lawn, Shibuya, and Stein (2005), data on neonatal deaths from Black and others (forthcoming) and data on maternal time of death from Li and others (1996).

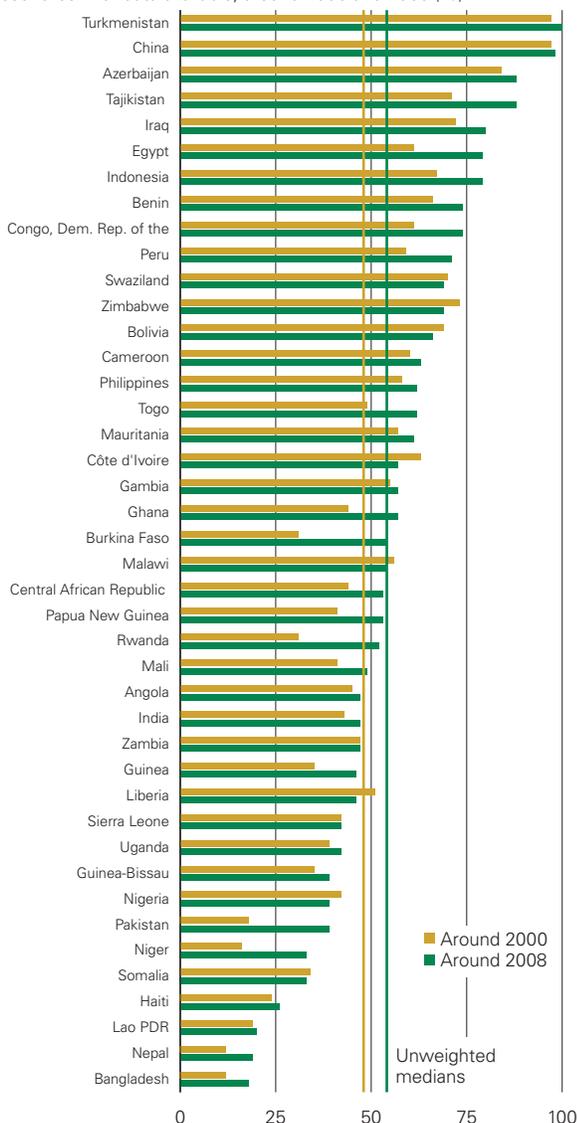
Quality gaps in care before, during and immediately after childbirth

Antenatal, delivery and postnatal care are service contact points and offer opportunities for the provision of effective interventions that can prevent illness and save lives. Median coverage for four or more antenatal care visits was 50% across the 51 *Countdown* countries with data since 2000, ranging from 6% in Somalia to 89% in Brazil. Contact with a trained service provider during pregnancy provides the opportunity for delivery of numerous proven interventions that improve outcomes for mother and newborn, including treatment of hypertension to prevent eclampsia, tetanus

FIGURE 10

Progress in increasing the proportion of women attended by a skilled provider at birth has varied

Coverage of live births attended by a skilled health worker, *Countdown* countries with data available, around 2000 and 2008 (%)



Source: UNICEF Global Databases, November 2009, based on Demographic and Health Surveys, Multiple Indicator Cluster Surveys and other national household surveys.

immunization, intermittent preventive treatment for malaria and distribution of insecticide-treated nets, prevention of mother-to-child transmission of HIV, micronutrient supplementation, and counselling on family planning and birth preparedness. UNICEF, UNFPA and WHO recommend at least four antenatal care visits at key stages through pregnancy. The number of visits alone will not save lives, of course, unless high-quality, effective interventions are delivered during visits. Work is continuing on the

BOX 5

Strategies for increasing coverage for skilled birth attendant at birth

Improving coverage of skilled attendant at birth requires strategies that address supply- and demand-side barriers to care and service quality. Some countries, such as Indonesia, are addressing supply-side barriers by training a new cadre of community midwives and bringing care into the home and local community. Other countries, such as Mozambique, are using task-shifting to enable midwives and other nonphysician clinicians to provide essential interventions, including caesarean sections. Subnational examples of progress in India include public-private partnerships to increase the number of private obstetricians delivering services to the rural poor in Gujarat, conditional cash transfers and a remuneration mechanism for community health workers.¹ These initiatives need to be assessed for impact and for the feasibility of being scaled up. On the demand side, reducing financial barriers is a common feature of success. Ghana recorded a rapid increase in facility births linked to the introduction of a national insurance scheme and new policies guaranteeing free care at birth.² Rwanda's "Paying for Performance" strategy increased institutional deliveries by providing financial incentives to providers to increase the use and quality of care.³

Notes

1. Mavalankar and others 2009; Lee and others 2009; India 2005; Devadasan 2008.
2. Witter, Armar-Klemsesu, and Graham 2009.
3. Basinga 2010.

measurement challenges associated with assessing coverage for individual interventions and service quality during antenatal care visits.

Not all women who have contact with a health provider during childbirth and in the immediate postnatal period receive the range of interventions that are needed (such as active management of the third stage of labour with the delivery of oxytocin to prevent post-partum haemorrhage). This quality gap is a missed opportunity to improve maternal and newborn health and reduce stillbirths. Postnatal care for mothers and newborns is another gap: data are lacking for many countries (45 of the 68 have no data), coverage is low in the 23 countries with data available (median coverage of 38%), and effective interventions are often not provided. Only six *Countdown* countries have data on postnatal care for the newborn, and the median coverage is low (4%).



Every newborn and child healthy

Solutions and innovations to save newborn lives

Risk of death is high for both mother and newborn in the first few days of life. There has been an explosion of interest and research in preventing newborn deaths,⁸ but some newer interventions are not yet reflected in *Countdown* tracking. Two examples are antenatal steroids—a high-impact, evidence-based intervention delivered during preterm labour that has been associated with a 53% reduction of newborn deaths due to preterm birth complications⁹—and kangaroo mother care—a simple technique where the newborn is kept close to the mother’s body in front, providing warmth, increased feeding, reduced infections and more rapid recognition of illness. New evidence shows that hospital-based kangaroo mother care

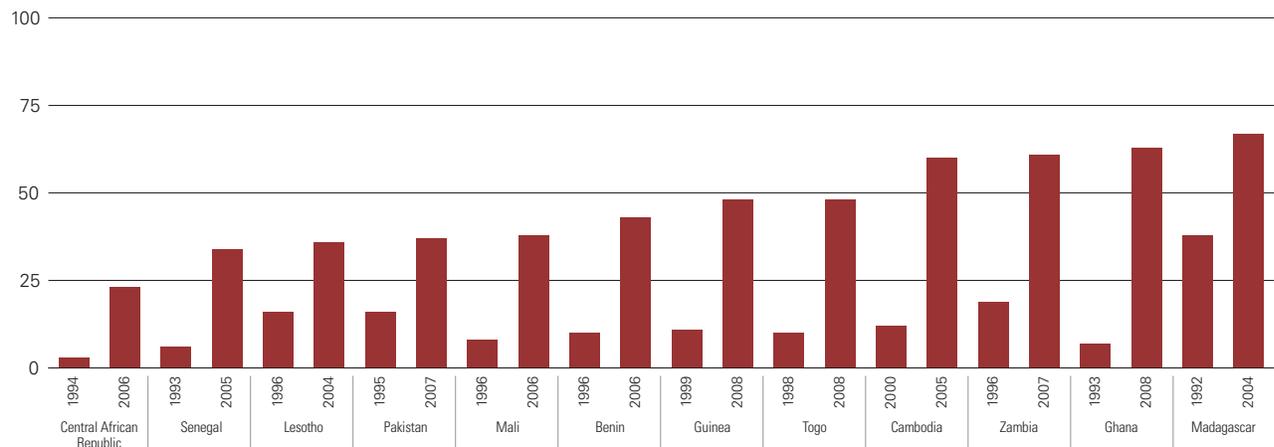
can reduce deaths for newborns under 2,000 grams (almost all preterm) by 51%.¹⁰

Evidence on the importance of providing postnatal care within two days of delivery has led to a joint WHO–UNICEF statement calling for broader implementation and scaling up.¹¹ Simple interventions such as early initiation and exclusive breastfeeding (figure 11), keeping the newborn warm, hygienic cord and skin care have the potential to reduce a large number of newborn deaths.

Other known, proven interventions to protect the lives of newborns and young infants are tracked by *Countdown* to determine progress in coverage at the country level. Rates in 2010 show some important gains, but many missed opportunities.

FIGURE 11
Exclusive breastfeeding is a major contributor to child survival

Share of infants under the age of six months who are exclusively breastfed, *Countdown* countries that have increased rates of exclusive breastfeeding among infants less than age 6 months 20 percentage points or more (%)



Source: UNICEF Global Databases, November 2009, based on Demographic and Health Surveys, Multiple Indicator Cluster Surveys and other national surveys.

Progress in preventing major childhood infectious diseases

Countdown results highlight progress on a country-by-country basis in preventing the infectious diseases responsible for the majority of child deaths. There has been important progress in combating malaria through increased use of insecticide-treated nets in malaria-endemic countries (figure 12) and in preventing mother-to-child transmission of HIV (box 6). More work needs to be done, however, for countries to reach the Roll Back Malaria target of 80% coverage of insecticide-treated nets by 2010 and universal coverage of prevention of mother-to-child transmission for HIV positive pregnant women.

Greater attention to improved water and sanitation can prevent diarrhoea

MDG target 7.C on environmental sustainability is to halve, by 2015, the proportion of people without

sustainable access to safe drinking water and basic sanitation. Median coverage in the 65 *Countdown* countries with data available since 2000 is 71% for use of an improved drinking water source and 41% for improved sanitation (figure 13). More efforts are needed to promote better hygiene and to ensure that adequate drinking water and sanitation are available to all in order to reduce child deaths from diarrhoea.

Improving infant and young child feeding practices will save lives

Available evidence demonstrates that child growth and development are optimized when:

- Breastfeeding is initiated within one hour of birth.
- Exclusive breastfeeding is continued up to age six months.
- Complementary feeding with safe and age-appropriate solid, semi-solid or soft foods is started at age six months.

BOX 6

Preventing mother-to-child transmission of HIV

HIV accounts for a relatively small proportion of deaths among children under age 5 across the *Countdown* countries as a whole. But in a subset of 15 high-HIV-burden *Countdown* countries (those with prevalence of 5% or higher), it continues to be a major threat to survival and child development (see table). Preventing HIV infection in women and children requires a strategy across the continuum of care, integrating:

- Interventions directed at reducing infection among young people with access to information and testing.
- Interventions to meet the family planning needs of women living with HIV.
- Antiretroviral therapy where needed.
- Safe practices during childbirth.
- Guidance for selecting safe and optimal infant-feeding options to prevent mother-to-child transmission of HIV.
- Provision of antiretroviral regimens for the prevention of mother-to-child transmission of HIV.
- Scaling up early infant diagnosis to ensure prompt and effective treatment of infections.

There have been dramatic increases in prevention of mother-to-child transmission coverage in 9 of the 15 high-HIV-burden *Countdown* countries. Cameroon and the Central African Republic saw more modest gains, and Botswana (already at 95% coverage) and Congo saw limited gains (Malawi and the United Republic of Tanzania do not have data for 2008). These results

demonstrate what is possible when both commitment and resources are focused on reaching a target population with a specific intervention.

Share of HIV-infected women ages 15–49 who received antiretroviral regimens for prevention of mother-to-child transmission, high-HIV-burden *Countdown* countries, 2006 and 2008

Country	2006		2008	
	Point estimate	Range estimate	Point estimate	Range estimate
Botswana	95	95–>95	>95	75–>95
Cameroon	22	18–30	28	20–53
Central African Republic	18	16–20	23	16–44
Gabon	4	3–5	35	22–70
Kenya	48	42–59	56	37–>95
Lesotho	17	15–18	57	43–>94
Malawi	14	12–16	—	41–>95
Mozambique	13	11–15	42	26–93
South Africa	50	43–60	73	53–>95
Swaziland	62	57–69	>95	87–>95
Tanzania, U. Rep.	15	14–16	—	53–>95
Uganda	25	22–28	50	36–95
Zambia	35	31–39	59	43–>95
Zimbabwe	17	16–19	36	26–64

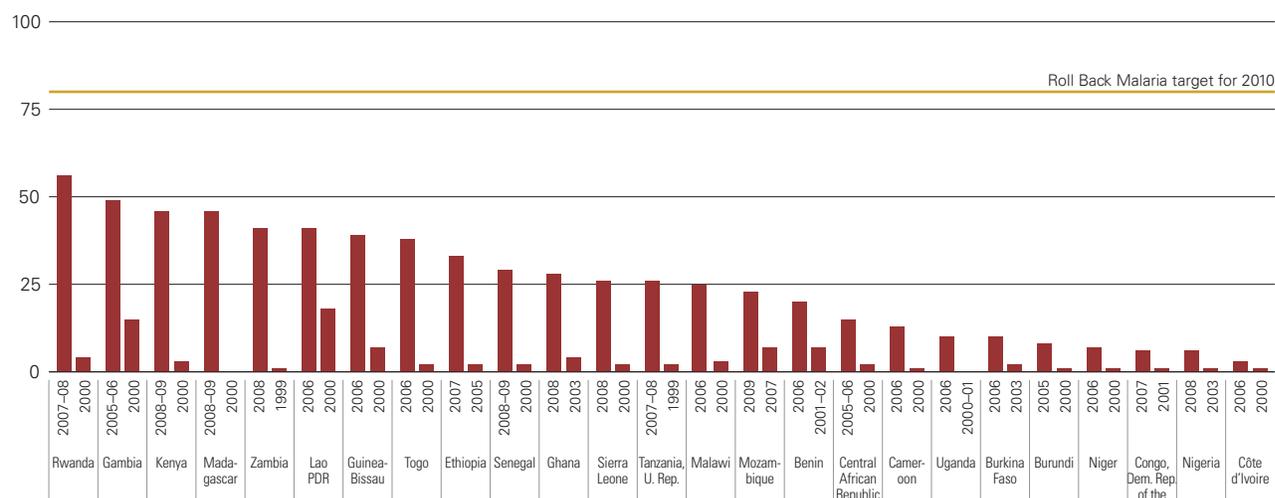
— is not available.

Source: 2006 data, WHO and UNICEF (2007), with the denominators derived from unpublished UNAIDS-WHO estimates; 2008 data, UNICEF, UNAIDS, WHO, and UNFPA 2009.

FIGURE 12

Some Countdown countries show rapid progress in preventing malaria through insecticide-treated nets

Share of children under five sleeping under an insecticide-treated net the night before the survey, various years (%)



Note: For each country, the left bar shows the most recent year with data on coverage values and the right bar shows data for a previous year.
 Source: UNICEF Global Databases, November 2009, based on Demographic and Health Surveys, Multiple Indicator Cluster Surveys and other national surveys.

Some Countdown countries are progressing in these areas, and 12 have increased exclusive breastfeeding rates by 20 percentage points or more (see figure 11). But most Countdown countries have much room for improvement (figure 14). Current median coverage based on latest available estimates since 2000 are 48% (ranging from 20% to 78%) for early initiation of breastfeeding, 34% (ranging from 1% to 88%) for exclusive breastfeeding among infants less than age 6 months and 66% (ranging from 15% to 93%) for timely introduction of complementary feeding.

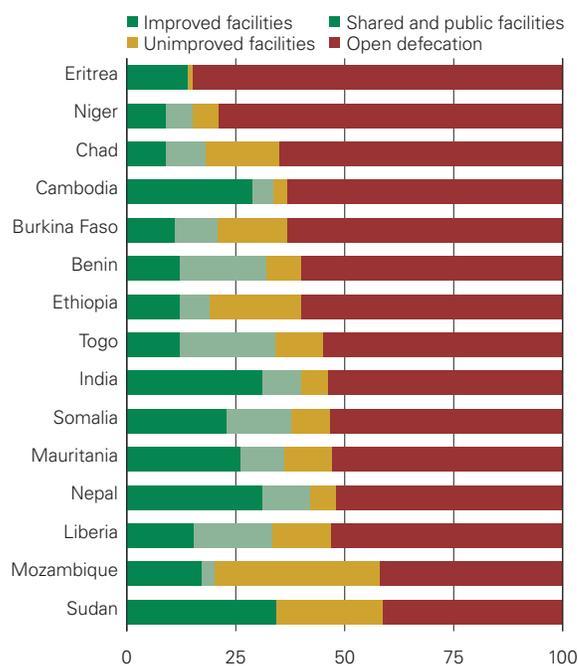
Vaccination and vitamin A

Vaccination coverage rates have generally remained high, with median 2008 coverage rates in Countdown countries of 79% for measles vaccination (ranging from 23% in Chad to 99% in Brazil and Turkmenistan) and 83% for diphtheria and tetanus with pertussis (DPT3) vaccination (ranging from 20% in Chad to 99% in Morocco and Peru). Vaccination rates for neonatal tetanus also remain high, with a median of 83% of newborn children considered protected at birth in 2008 (ranging from 47% in Lao PDR to 97% in Sierra Leone). New vaccines for pneumococcal pneumonia and diarrhoea due to rotavirus can build on these delivery successes as they are scaled up in the next few years. Vitamin A supplementation (two doses) estimates for 2008

FIGURE 13

Open defecation, common in some Countdown countries, increases the risk of diarrhoeal disease

Share of the population reporting open defecation, 15 Countdown countries with the highest share (%)

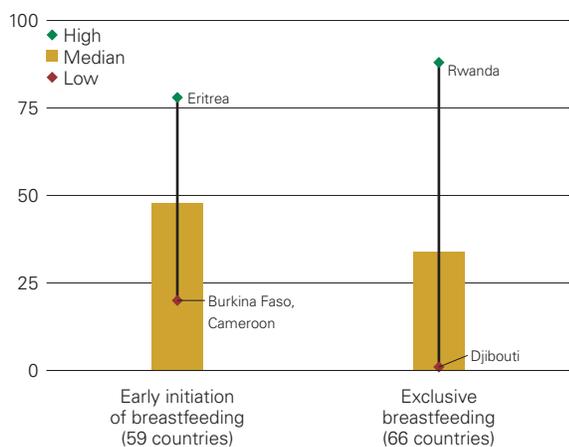


Source: WHO-UNICEF Joint Monitoring Programme for Water Supply and Sanitation 2010.

FIGURE 14

Early initiation of breastfeeding also contributes to child survival

Coverage rates for early initiation of breastfeeding and exclusive breastfeeding (%)



Source: UNICEF Global Databases, November 2009, based on Demographic and Health Surveys, Multiple Indicator Cluster Surveys and other national surveys.

show a median of 86%, ranging from no vitamin A coverage in Chad and Gabon to 100% coverage in Burkina Faso and Somalia. Chad and Gabon faced major challenges to vitamin A delivery in 2008: Chad experienced a looting of supplies, and Gabon lacked the funding needed to carry out Child Health Days. These two examples are important reminders of the challenges many *Countdown* countries face in sustaining basic services.

Coverage of correct treatment for childhood illness remains too low

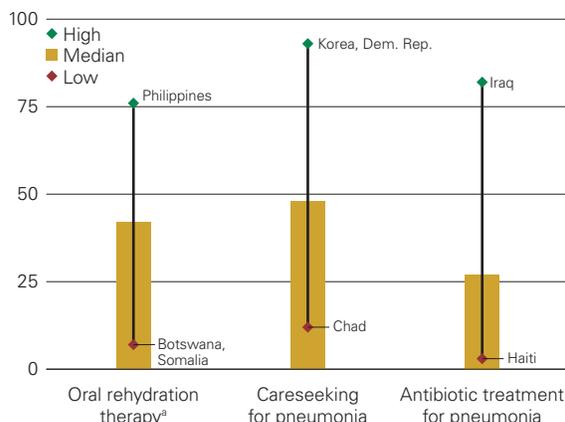
Progress in care-seeking and case management of common childhood diseases has been very slow. Scaling up case management requires families and communities to be aware of danger signs and to bring children for care. It also requires quality care to be available, which requires adequate human resources and commodities. Unless care is provided close to home, reducing mortality rates will be difficult (box 7).

Correct treatment of diarrhoea includes reducing susceptibility to severe diarrhoea and dehydration through improved nutrition and prompt treatment of watery diarrhoea with oral rehydration salts solution and zinc while continuing to feed the child.¹² Median coverage of correct treatment of diarrhoea in *Countdown* countries was only 42% (figure 15)—a figure that masks variability across countries and

FIGURE 15

Too few children with diarrhoea or pneumonia receive correct treatment

Children with diarrhoea or pneumonia receiving correct treatment (%)



a. Oral rehydration salts, recommended home fluids or increased fluids, and continued feeding.

Source: UNICEF Global Databases, November 2009, based on Demographic and Health Surveys, Multiple Indicator Cluster Surveys and other national surveys.

in some instances within countries. There has been rapid policy uptake of “new” low-osmolarity oral rehydration salts and zinc, with 46 *Countdown* countries reporting having adopted such a policy.

Correct treatment of childhood pneumonia and neonatal infections (sepsis and pneumonia) includes antibiotics. This requires a caregiver to recognize signs of illness and seek care from a trained provider. Median coverage of careseeking was only 48% for the 64 *Countdown* countries with data available, while the median coverage of children with suspected signs of pneumonia who actually received an antibiotic was 27% in 35 countries with data.

Correct treatment of childhood malaria requires administration of an effective antimalarial within 24 hours of onset of symptoms.¹³ The current “gold standard” treatment in most malaria-endemic countries is artemisinin-based combination therapies, for which funding and procurement have rapidly increased. Beginning in 2010, *Countdown* will track coverage by type of antimalarial treatment because treatment with chloroquine and other antimalarials is no longer effective in most malaria-endemic countries. Figure 16 shows that tracking coverage by type of antimalarial is important for determining whether children are receiving effective treatment.

Bringing care for sick children closer to home

What evidence is there of the effect of community case management?

Community case management requires trained community health workers to deliver high-impact, curative interventions to children whose families lack access to facility-based care. Recent WHO–UNICEF joint statements summarize the evidence that community health workers can recognize and manage common life-threatening childhood illnesses.¹ The statements cover diarrhoea, pneumonia, malaria and uncomplicated severe acute malnutrition. Several studies report positive outcomes of community case management on pneumonia, including a recent review suggesting a 70% reduction in pneumonia deaths among children under age 5² and others showing the effectiveness of community health worker administration of oral antibiotics for neonatal pneumonia in the absence of referral. Community case management has also been used effectively for malaria (including with artemisinin-based combination therapies) and diarrhoea treatment.

Where is community case management working?

Since the 2008 *Countdown* report, 11 countries have changed policy to allow community-based management of pneumonia, increasing the total number of *Countdown* countries in support of community case management to 29. Nepal and Senegal have already scaled up community programmes for management of pneumonia with positive results. Ethiopia and Uganda recently adopted supportive policies and are ready to introduce and rapidly scale up integrated community case management. And India and Malawi now implement integrated management of childhood illness at the community level. Preliminary results from Malawi have shown that health surveillance assistants (government-paid, multipurpose extension health workers) can perform an integrated assessment and treat children

appropriately. Families appreciated the proximity and quality of care, and service utilization increased.

What is next for community case management?

Few studies or programmes have systematically evaluated the process and effect of integrated community case management for a comprehensive range of neonatal and childhood illnesses. However, evaluations of the effect of community case management for multiple childhood illness conditions are under way. More work is also necessary to assess a recommended package of services and tasks that a community health worker can deliver reasonably well. For example, would a community health worker providing community case management also be able to provide home-based newborn care? Studies to develop simplified antibiotic regimens for the treatment of neonatal sepsis have commenced and will inform the future role of community health workers in the treatment of severe newborn illness. Two studies from South Asia, for example, present evidence that community health workers can correctly provide treatment for neonatal sepsis with injection gentamicin, but this intervention has not been widely implemented.³ Community case management may be particularly effective in settings where populations are experiencing conflict or natural disasters, but data are lacking.

Countdown countries are tracking the evidence on community case management for newborns carefully, because standard inpatient treatment for seven days for newborn illnesses is not feasible for some families in many of these settings. Including the treatment of uncomplicated severe acute malnutrition in integrated community case management is a possibility.

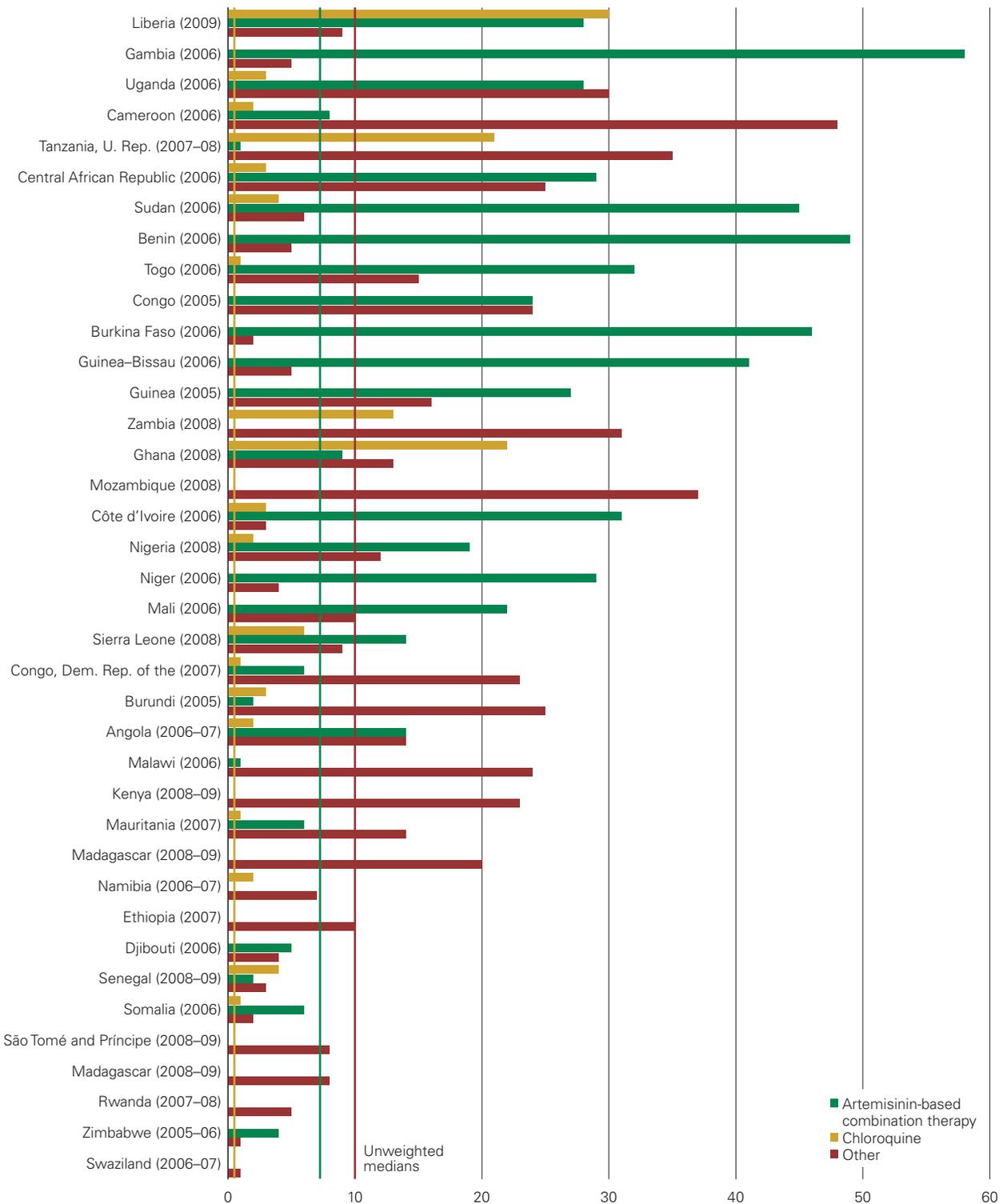
Notes

1. WHO and UNICEF 2004b.
2. Theodoratou and others 2010.
3. Bang and others 1999; Baqui and others 2009.

FIGURE 16

Saving lives from malaria requires the right medicine

Children with fever receiving antimalarial treatment, selected *Countdown* countries, various years (%)



Source: UNICEF Global Databases, November 2009, based on Demographic and Health Surveys, Multiple Indicator Cluster Surveys and other national surveys.

The building block framework: health systems and policies to save the lives of women, newborns and children



Coverage of effective interventions is to a large extent the result of the quality and effectiveness by which health services reach people and people's to access them. A well functioning health system comprises several building blocks that have multiple relationships and interactions, with people at the centre. To understand the context in which countries are making efforts to scale up maternal, newborn and child health interventions, the *Countdown* examined progress of key indicators related to each of the building blocks, complementing the information on intervention coverage (a direct function of service delivery).

Health systems are more than building blocks

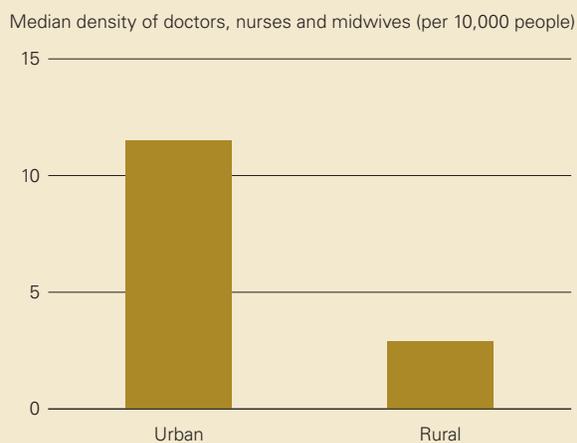


Source: Alliance for Health Policy and System Research 2010.

Human resources

The challenge: shortages and maldistribution

Only 15 *Countdown* countries (22%) meet the critical threshold of 23 doctors, nurses and midwives per 10,000 people generally considered necessary to deliver essential health services.¹⁴ The shortage is compounded



Note: Median refers to 26 *Countdown* countries with data available.
Source: WHO 2009.

by uneven geographic distribution within countries.¹⁵

Increased investment in education of health workers, strategies for motivating health workers to remain in underserved areas and effective regulatory frameworks (including those for skills substitution) are among the effective policy options for addressing critical workforce shortages and maldistribution.

One potential solution: task-sharing to supplement services

Ethiopia, Ghana and Pakistan are among the countries addressing workforce shortages and maldistribution challenges through comprehensive strategies, including deployment of health service providers at the community level.¹⁶ The United Republic of Tanzania and Zambia have authorized nonphysician clinicians to carry out certain specialized tasks.¹⁷ More than 90% of caesarean sections in rural areas in Malawi and Mozambique are performed by surgical technicians, with low morbidity and mortality.¹⁸

Health financing

The challenge: excessive out-of-pocket payments

Median per capita health expenditure in the *Countdown* countries is \$80 (in 2007 international dollars), and only five countries devote at least 15% of their national budgets to health.¹⁹ Only five countries have out-of-pocket expenditure as a percentage of total health expenditure of less than 15%; above this value households may be more vulnerable to catastrophic payments.²⁰

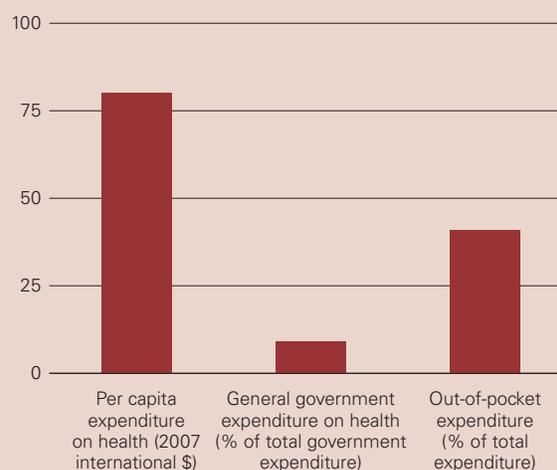
Maternal, newborn and child health services should be available, of good quality and free at the point of delivery in order to remove financial barriers to access and utilization.²¹

Some solutions to move to universal access

A key step towards universal coverage is to move away from out-of-pocket payments through prepayment and risk-pooling schemes.²² Several countries—Mexico, with *Seguro Popular*,²³ and China,²⁴ with the New Rural Cooperative Medical

Scheme—are moving in this direction. In Mali and Rwanda social health insurance schemes are achieving high coverage²⁵ and showing a positive effect on access to priority health services, including maternal, newborn and child health.²⁶ Uganda increased coverage of essential health services, particularly among the poor, by removing user fees.²⁷

Financing indicators, median of 68 *Countdown* countries



Source: WHO 2010.

Medicines and equipment

The challenge: continuous supply of commodities

Access to medical products, technologies and essential drugs remains erratic in many countries, contributing to low coverage of family planning and poor availability of emergency obstetric care services.

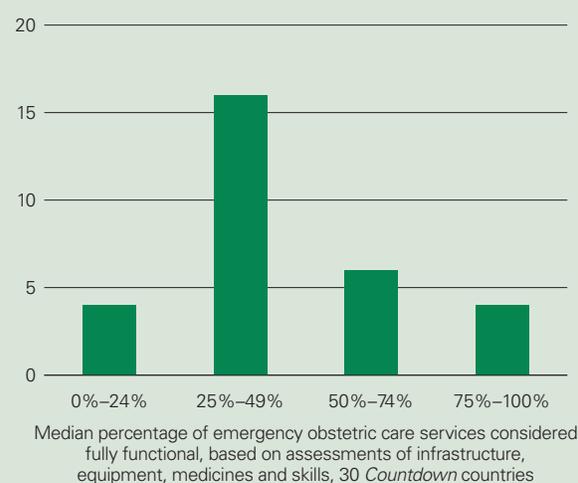
Updated policies on care for maternal, newborn and child conditions need to be accompanied by investment in infrastructure, medicines and supplies, in order to reach universal coverage and make an impact on women's and children's lives.

Possible solutions

Local production of zinc blister packs in Bangladesh combined with health education and promotion through private sector has rapidly

increased coverage of zinc use rate in children with diarrhoea to 20%.²⁸ Globally, UNICEF increased procurement of zinc from 20.5 million tablets in 2006 to 158 million tablets in 2008.

Number of countries



Source: WHO, UNFPA, UNICEF, and AMDD 2009.

Health information

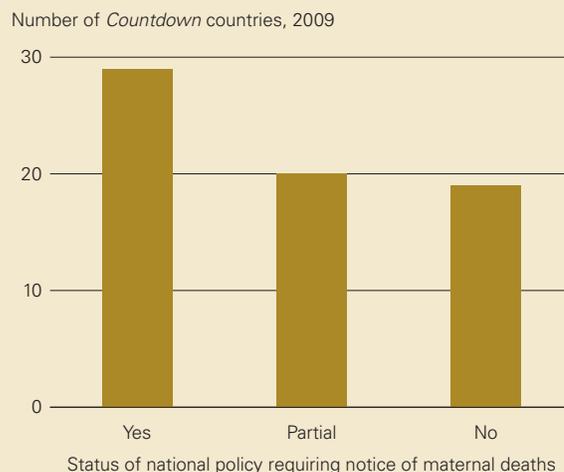
The challenge: timely, high-quality information

Decision-makers in most *Countdown* countries do not have the information they need to inform decisions and guide action.²⁹ Vital statistics, including birth registration and maternal death notification, and programme funding are examples of mechanisms that can address barriers to the quality of and access to health services.³⁰

One potential solution: maternal death audit and remedial action

The comprehensive monitoring and evaluation approach adopted in Tamil Nadu, India, which includes stronger information generation and use for decision-making accompanied by maternal death audits and surveillance, has improved maternal and child indicators.³¹

South Africa has also made progress in institutionalizing maternal death audits, which can reduce maternal and perinatal mortality.³²



Source: WHO 2009.

Governance and leadership

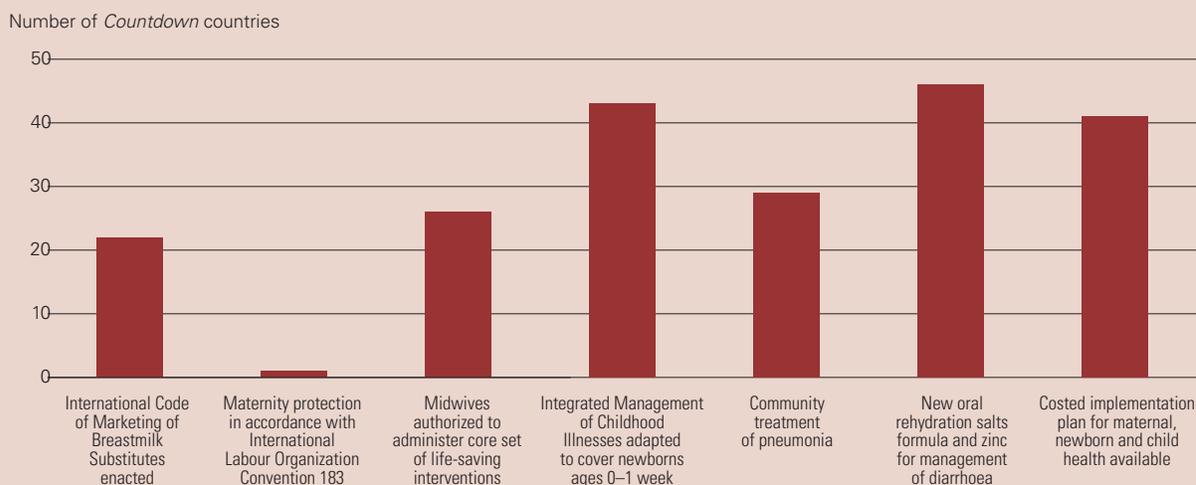
The challenge: universal adoption of policies that support maternal, newborn and child health

Too few countries have adopted evidence-based policies to increase access to and quality of essential maternal, newborn and child health services as recommended by WHO–UNICEF joint statements.³³ Just over one-third of *Countdown* countries allow midwives to perform lifesaving interventions, while 46 countries have updated guidelines on management of diarrhoea. Nevertheless, 29 countries have adopted national policies allowing community health

workers to manage pneumonia, compared with 18 in the 2008 *Countdown*. The presence of a national, costed MNCH implementation plan, necessary to estimate and allocate resources efficiently was reported by 41 countries.

Possible solutions

Bangladesh and Nepal have shown that policies that increase access to treatment of diarrhoea and pneumonia in the community are effective in increasing coverage of child health interventions.³⁴ Allowing midwives to perform lifesaving interventions increases access to basic emergency obstetric care services and can reduce maternal mortality.³⁵



Source: WHO 2009.

Equal care for every mother and child



National data on coverage levels often hide important disparities among population subgroups. The *Countdown* equity analyses include systematic breakdowns of key coverage indicators by wealth quintiles, maternal education, sex of the child, urban/rural residence and region of the country.³⁶

One way to summarize equity analyses is through a mean coverage index. Each country profile includes a figure showing the mean coverage index consisting of an unweighted average of four intervention areas across the continuum of care. Each area includes selected indicators for eight reproductive, maternal, newborn and child interventions: family planning (need for family planning satisfied), maternal and newborn health (at least one antenatal visit and skilled attendant at delivery), immunizations (measles, BCG and DPT3) and curative child care (diarrhoea and pneumonia management: oral rehydration and continued feeding and care seeking for pneumonia).

Figure 18 uses Benin as an example. The mean coverage index of the eight interventions is 73% among children in the richest wealth quintile compared with 41% in the poorest wealth quintile. The top part of figure 18 shows the coverage gap—or how much of an increase is needed to achieve universal coverage with all eight interventions. The gap equals 100% minus the mean coverage index and is much greater for the poor than for the rich.

In all 38 *Countdown* countries with Demographic and Health Survey data, intervention coverage is substantially higher among mothers and children from better-off households than among those from poor households (figure 17). Countries with similar levels of overall coverage may differ substantially in terms of equity. For example, both Guatemala and Zambia have an overall coverage index of 59%, but in Guatemala mothers and children from households in the poorest quintile show 38% coverage while in Zambia they show 55% coverage. Countries with smaller gaps between rich and poor—such as Bangladesh, Brazil, Egypt, Swaziland and Zambia—should be better studied to understand how they managed to reduce inequalities.

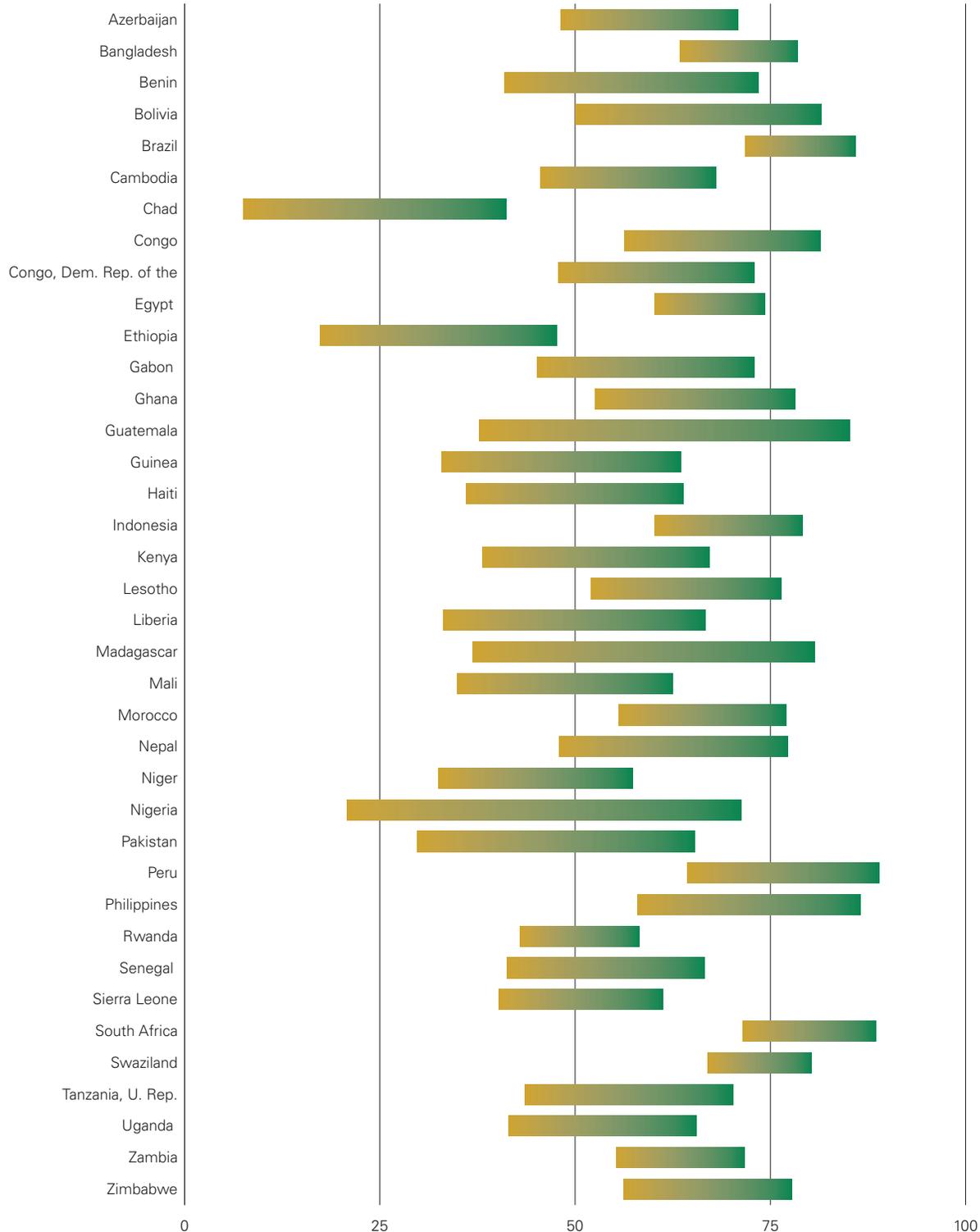
The equity analysis gaps are markedly larger for maternal and newborn interventions than interventions delivered to older children (figure 19). Interventions that are most frequently delivered in fixed health facilities (for example, antenatal, delivery or postnatal care) tend to show greater disparities than those delivered at the community level (for example, vaccinations, vitamin A supplementation or insecticide-treated nets). Family planning interventions, which may be delivered in fixed facilities or at the community level, fall between these two groups in terms of inequalities. Early initiation of breastfeeding shows remarkably small disparities—possibly because it is largely dependent on longstanding cultural practices not yet affected by promotion efforts.

FIGURE 17

The gap in intervention coverage between rich and poor households varies by country

Mean coverage index, poorest and richest wealth quintiles, selected Countdown countries, various years (%)

Poorest  Richest

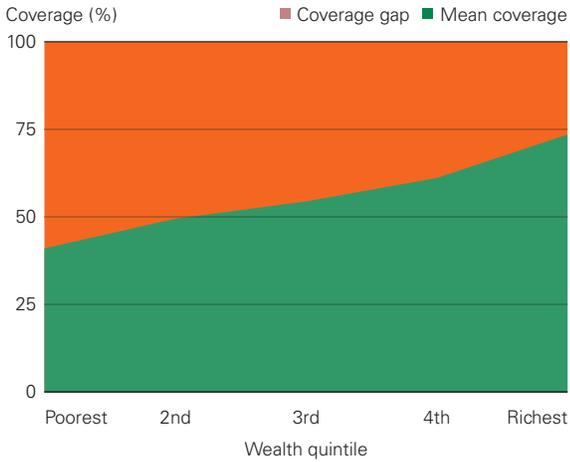


Note: Mean coverage index is based on coverage rates of eight maternal, newborn and child health interventions: met need for family planning, at least one antenatal care visit, skilled attendant at birth, measles vaccination, DPT3 vaccination, BCG vaccination, oral rehydration and continued feeding, and careseeking for pneumonia.

Source: Demographic and Health Surveys.

FIGURE 18

The coverage gap in Benin for eight maternal, newborn and child health interventions decreases as wealth increases

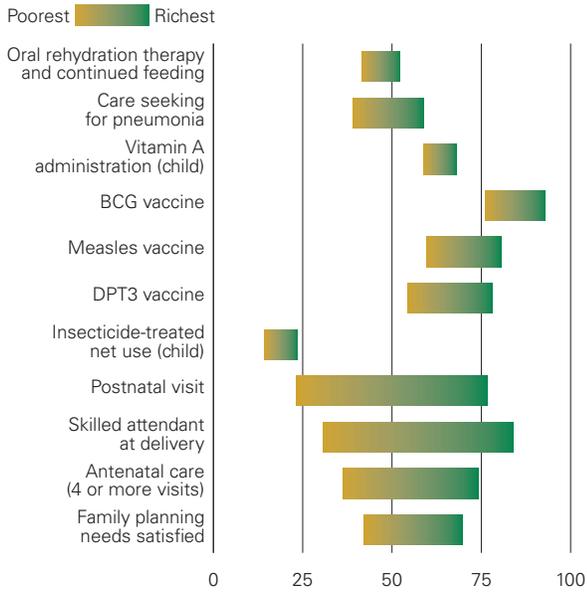


Source: Demographic and Health Surveys.

FIGURE 19

The degree of inequality is markedly larger for maternal and newborn interventions than for those delivered to older children

Average coverage levels of selected reproductive, maternal, newborn and child interventions, poorest and richest wealth quintile, 38 Countdown countries with data



Note: Postnatal care refers to postnatal care for all newborn infants.

Source: Demographic and Health Surveys.



Country spotlight: Brazil's success in narrowing the gap



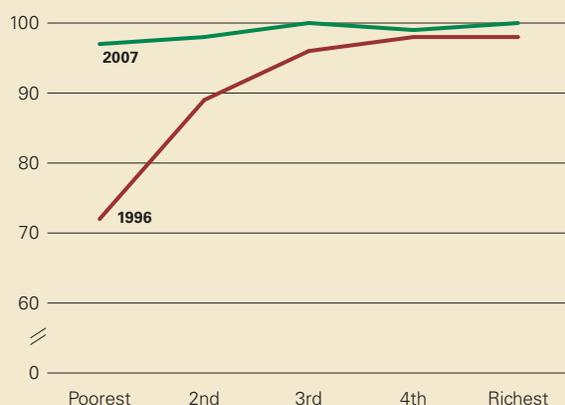
Brazil is one *Countdown* country on target to reach the MDGs related to child health and nutrition. Under-five mortality has been falling an average of 5.2% a year since 1990, considerably faster than the 4.4% needed to reach the MDG target. Currently, 22 of every 1,000 children now die before their fifth birthday.³⁷ Underweight prevalence among children under age 5 dropped from 5.7% in 1990 to 2.2% in 2006–2007,³⁸ while stunting fell from 19.9% to 7.1%.

Overall progress has been accompanied by a sharp decline in inequalities (see figures). In 1996 just over 70% of all births to mothers in the poorest socioeconomic quintile received skilled care during childbirth, but by 2007 coverage was universal. Likewise, stunting prevalence among children in the poorest quintile fell from 40% in 1989 to 10% in 2007, while remaining stable at 3%–5% in the richest quintile. These are only two examples among many for which equity improved in the last two decades.

Brazil's success in reducing inequities cannot be attributed to a single factor. Although economic growth has been moderate since 1990, income distribution showed marked improvements in recent years. A nationwide, tax-based unified health system without any user fees was launched in 1988, and geographic targeting has guided the deployment of family health teams of doctors, nurses and community health workers in the poorest areas of the country. As a result, primary health care coverage is now virtually universal, as seen with skilled delivery. In addition, Brazil's conditional cash transfer programmes cover about one third of the population, and multiple integrated health sector initiatives—including immunization, HIV control and breastfeeding promotion activities—have been highly successful.

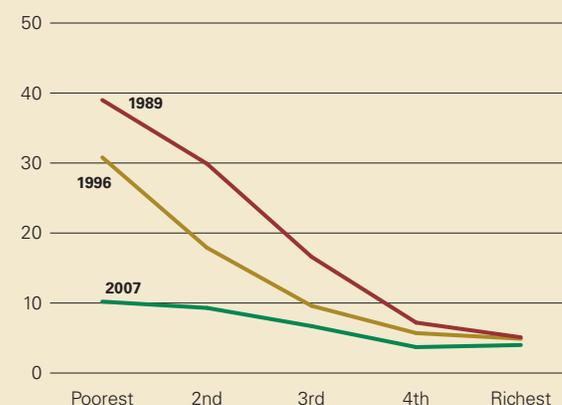
Perhaps more than any single policy or initiative, the reduction of regional and socioeconomic disparities in health and development has been a central element in Brazil's political agenda for the last 20 years, and it is now starting to bear fruit.

Coverage of skilled attendant at birth, by income quintile, Brazil, 1996 and 2007 (%)



Source: Barros and others 2010.

Prevalence of stunting among children under age 5, by income quintile, Brazil, 1989, 1996 and 2007 (%)



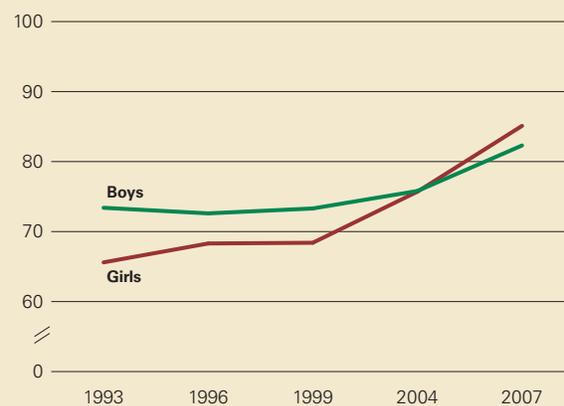
Source: Monteiro and others 2010.

Country spotlight: Narrowing gender differentials in Bangladesh



Historically, Bangladeshi boys have been more likely to receive lifesaving interventions than girls have (see figure), a pattern common in South Asian countries. But in the past decade Bangladesh has seen gender disparities effectively disappear in coverage of measles vaccination. As with Brazil, the observed success cannot be attributed to a single initiative, but a series of initiatives aimed at women's empowerment (micro-credit, women's groups, female education and the like) coupled with greater access to health care, particularly through selective outreach by community workers, may account for these changes. An in-depth analysis in the Matlab area shows that community health workers contributed to reducing gender inequities in immunization coverage.³⁹ Nevertheless, socioeconomic disparities in Bangladesh remain large.

Coverage of measles vaccination, by gender, Bangladesh, 1993–2007 (%)



Source: Demographic and Health Surveys.



Financing for maternal, newborn and child health



Monitoring financial resource flows for maternal, newborn and child health is a central part of the *Countdown*—determining the funding gap between resources currently available and the actual investments required to reach national and MDG targets and holding governments and the international community to account for investing adequately in the health of women and children. Policy-makers need financial information to make informed decisions on how to best allocate resources among competing needs, set priorities and ensure sustainable funding for programmes. This section presents an update on the financing gap and patterns in ODA; work on compiling data on national contributions is under way and will be reported in 2011.

Closing the gap: what resources are needed to scale up coverage of maternal, newborn and child interventions?

Preliminary estimates show that if current funding trends continue during 2008–2015, the 68 *Countdown* countries will face a roughly \$60 billion funding gap relative to the costs of implementing a full package of maternal, newborn and child health *Countdown* interventions (figure 20). If public commitments by both aid donors and governments are met (assuming a linear increase to 15% of gross national product by 2015 for African countries committed to reaching the Abuja target and 10%–12% for all other *Countdown* countries), the gap remains \$22 billion. This analysis shows that more funding is needed for countries to be able to provide universal coverage of essential maternal, newborn and child health services.

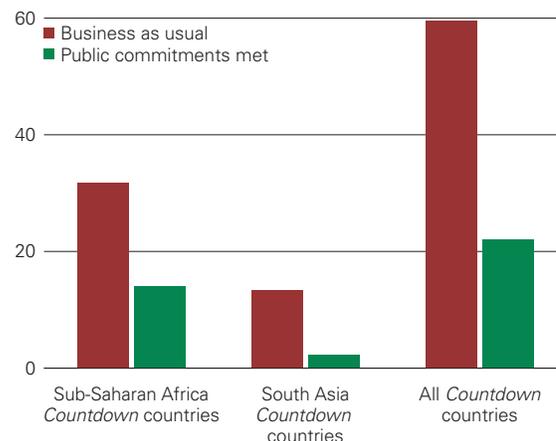
Official development assistance to maternal, newborn and child health shows promising trends

Total ODA for maternal, newborn and child health in 2007 was \$4.1 billion, up 16% from

FIGURE 20

What resources are needed to close the funding gap for maternal, newborn and child health in *Countdown* countries?

Financing gap in maternal, newborn and child health, by region, 2015 (\$ billions)



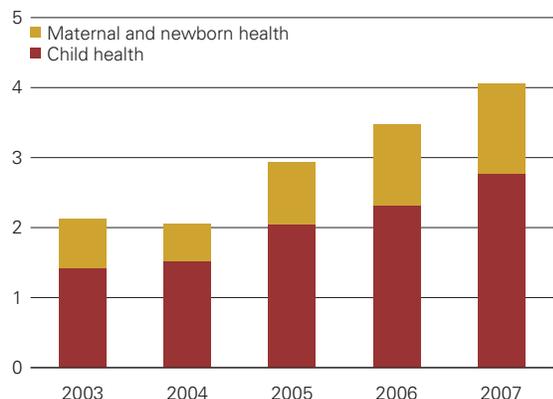
Source: Greco and others 2010.

2006 and nearly double the \$2.1 billion in 2003 (figure 21). Although these trends show improved commitment, ODA for maternal, newborn and child health accounted for only 31% of all ODA for health in 2007. ODA flows for maternal, newborn and child health are important to track, but national resources are a much larger share of funding for maternal, newborn and child health. Even for very low-income *Countdown* countries such as Ethiopia and Malawi, national sources account for half or more of total spending on reproductive and child health. Tracking government and nongovernment spending at the country level is essential for policy-makers to follow progress in making adequate resources available for women and children. Estimates of domestic expenditure on maternal, newborn and child health, including family planning, will be available in 2011 for a subset of *Countdown* countries.

FIGURE 21

Official development assistance for maternal and newborn health and for child health has been increasing

Official development assistance to child health and to maternal and newborn health, *Countdown* countries, 2007 (2005 \$ billions)



Source: Pitt and others 2010.

Trends in official development assistance by purpose

There are important differences in levels and trends for ODA to child health, maternal and newborn health, and family planning, which is included in *Countdown* for the first time in this update. Following significant declines in the 1990s, ODA for family planning continued to decline in real terms concurrent with increases in ODA for maternal, newborn and child health (figure 22). This may indicate replacement, with funds targeted to family planning being reallocated to maternal, newborn and child health—especially given that some interventions are delivered in the same service settings. Accurate donor reporting, including correct attribution of funds to specific service areas, is a problem with available data. Better-resourced maternal and child health services result in improvements in maternal, newborn and child survival and other health benefits similar to those that result from strengthened family planning services in many cases. In-depth analyses of these questions are under way and will be reported in 2011.

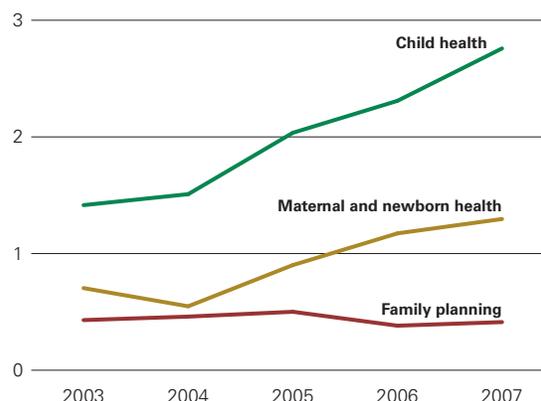
Is official development assistance targeted to countries in greatest need?

ODA flows are rarely well targeted to either the poorest countries or the countries with the greatest burden of mortality. Table 2 shows

FIGURE 22

Have increases in official development assistance for maternal, newborn and child health substituted for declines (in real terms) in official development assistance for family planning?

Official development assistance, *Countdown* countries, 2003–2007 (2005 \$ billions)



Source: Greco and others 2010; UNFPA Donor Support, March 2010, (http://www.unfpa.org/webdav/site/global/shared/documents/publications/2009/2008_donor_support_report.pdf).

TABLE 2

Official development assistance is not always going where it is most needed

Official development assistance to *Countdown* countries, by income group and under-five mortality rate, 2007

GDP per capita (\$)	ODA for maternal, newborn and child health per capita (\$)
Less than 500	0.02–6.40
500–1,000	0.24–6.90
More than 1,000	0.04–28.40

Under-five mortality rate (per 1,000)	ODA for child health per child under age 5 (\$)
More than 200	4.0–28.7
150–200	4.5–225.7
100–149	2.7–18.9
Less than 100	0.3–12.9

Source: Greco and others 2010.

the distribution of ODA by country income group and under-five mortality level. The wide and overlapping range of ODA for maternal, newborn and child health per capita by country income group and of ODA to child health per child by under-five mortality level indicates the weak link between ODA levels and these two measures of need.

Action now for Millennium Development Goals 4 and 5



The majority of maternal, newborn and child deaths are preventable. Commitments to action are needed by governments and the international community to:

- Make every mother and child count, by registering and counting every birth and death.
- Ensure that every woman, newborn and child has access to essential health services, by overcoming financial barriers.
- Improve equity, by making services available to poor, remote and vulnerable populations.
- Ensure adequate numbers of skilled health workers in every district, by prioritizing training, distribution and retention.

Specific actions for governments and leaders

All countries should:

- Identify inequities in coverage—by geographic area, ethnic group, income and the like—and initiate actions to provide universal coverage of essential interventions and packages.
- Identify gaps in coverage and quality of care along the continuum of care.
- Initiate actions to improve the delivery of essential interventions and packages.
- Increase resource allocations for reproductive, maternal, newborn and child health services, ensuring that interventions and programmes are sufficiently funded.

Parliamentarians should:

- Participate in national and local reviews of health MDG data to monitor progress
- Advocate for greater budgetary resources for maternal, newborn and child health and hold governments to account for meeting promised commitments.
- Review legislative frameworks to be sure evidence based policies for women's and children's health are adopted.

Countries on track to achieving their MDG4 and MDG5 targets should:

- Continue to improve coverage and maintain declines in child, newborn and maternal mortality.
- Ensure that all underserved populations are reached.
- Document and share experiences to show how effective policy changes, programme approaches and investments have helped improve maternal, newborn and child health.

Countries making progress towards achieving Millennium Development Goals 4 and 5 should:

- Identify high coverage interventions and document the approaches and investments that supported those achievements.
- Identify low coverage, but high impact, interventions in order to determine how best to provide additional attention and investment.
- Identify and overcome health system constraints and social determinants hindering high coverage.
- Broaden focus to reach underserved populations.

Countries not making progress in reaching Millennium Development Goals 4 and 5 should:

- Identify resource, health system and broader contextual constraints to high coverage.
- Develop national investment and implementation plans for scale-up of interventions proven to reduce maternal, newborn and child mortality.
- Learn from successful local programmes and global research findings
- Adopt and implement evidence-based policies.
- Utilize international expertise and resources.
- Focus on scaling up using innovative strategies.

Countries that have not adopted internationally recommended policies should:

- Review those policies in relation to their own policies and conditions.
- Act on policies that will contribute to improving reproductive, maternal, newborn and child health.

Specific actions for the international community

- Increase and better target donor funding for reproductive, maternal, newborn, and child health through innovative mechanisms and ensure that funding is predictable, consistent and responsive to national needs and plans.
- Support country efforts to improve data collection and analysis by strengthening health information and vital registration systems as well as by undertaking additional surveys to

measure mortality, coverage and financial flows.

- Invest in implementation research to identify effective strategies for delivering proven interventions and quantify their impact.
- Maximize financial and technical support for large-scale implementation of priority strategies and interventions.
- Encourage the development and use of mechanisms for holding key actors accountable for fulfilling their commitments.



Conclusion



Countdown to 2015: Tracking Progress in Maternal, Newborn and Child Survival was founded on a commitment by academics, governments, international agencies, health care professional associations, donors and nongovernmental organizations to work together towards achieving Millennium Development Goals 4 and 5. By monitoring country progress in the 68 countries that account for more than 95% of all maternal and child deaths and by noting changes in both mortality and coverage of effective interventions, *Countdown* calls attention to what can be achieved and highlights where countries, interventions and health systems have stalled.

This third *Countdown* report documents changes since 2000, a decade of rapid progress for a few countries and continuing improvements for many others. Despite these positive signs, some

countries have shown little or no improvement in mortality rates and coverage levels or have yet to adopt the policies or evidence-based interventions that save lives. This report explores coverage determinants—including health systems and policies, financial flows and equity—that help explain these differences and acknowledges the importance of social determinants to maternal, newborn and child health and survival.

Countdown partners must work together now to increase their efforts and resources, focusing not just on one intervention or cause but on developing a functional continuum of basic services that save lives and improve health for millions of women, newborns and children. There is still time. This report shows that, by investing our attention and our financial resources, so much more is possible.



Notes



1. You and others 2009.
2. Jones and others 2003.
3. Black and others forthcoming.
4. Black and others forthcoming.
5. Gwatkin and others 2007.
6. Rutstein 2005.
7. WHO 1985.
8. Wall and others 2009.
9. Mwansa-Kambafwile and others 2010.
10. Lawn and others 2010.
11. WHO and UNICEF 2009.
12. UNICEF and WHO 2009.
13. UNICEF, Roll Back Malaria, and The Global Fund to Fight AIDS, Tuberculosis and Malaria 2009.
14. WHO 2006.
15. WHO 2009.
16. Phillips, Bawah, and Binka 2006; Wakabi 2008; Douthwaite and Ward 2005.
17. Dovo 2004.
18. Pereira and others 2007; Vaz and others 1999.
19. WHO 2010.
20. Xu and others 2005.
21. WHO 2005b.
22. WHO 2005a.
23. Gonzalez-Pier and others 2007.
24. Parry and Weiyuan 2008.
25. Kagumire 2009.
26. Franco and others 2008.
27. Nabyonga and others 2005.
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29. Shankar and others 2008.
30. AbouZahr and others 2007.
31. WHO Regional Office for South-East Asia 2009.
32. South Africa Every Death Counts Writing Group 2008.
33. WHO and UNICEF 2004a, 2004, 2009.
34. Dawson and others 2008.
35. Koblinsky and others 1999, 2006.
36. Boerma and others 2008.
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