

Narrowing the child mortality gap

Ensuring the survival of children into adulthood is an issue that has resonated with policymakers and health advocates perhaps more than any other in global health. There has been general agreement that child mortality rates have been dropping, but until now, it hasn't been clear by how much.

IHME has found that global under-5 mortality rates have improved at a faster pace than previous estimates have indicated. There has been steady improvement both in the crucial first months of life and through early childhood to age 5.

In 2008, the number of deaths of children under age 5 dropped below a critical threshold for the first time in recent history. IHME estimates that annual deaths of children under 5 dropped below 8 million that year to 7.95 million, down from 11.9 million in 1990.

Since 1970, the number of under-5 deaths has been reduced by more than 50%, while the total number of births has increased 15% in that time period.

United Nations member countries set a goal of a two-thirds reduction in child mortality between 1990 and 2015, known as MDG4. Thirty-one developing countries are on pace to reach that goal based on their annual rates of decline in under-5 mortality between 1990 and 2008. Overall progress has been better than previous estimates have shown: Neonatal deaths declined by 2.1% annually between 1990 and 2008, while postneonatal deaths dropped 2.3%.

IHME assessed the levels of under-5 mortality for 187 countries from 1970 to 2008 with projections to 2010. We created a database with more than 16,000 data points – twice as many as in previous estimates. We

used all available sources, including vital registration, summary birth histories, and complete birth histories in censuses and surveys. We also developed new methods to analyze the data and had the methods validated, peer-reviewed, and published.

IHME's estimate of 7.95 million child deaths in 2008 is about 820,000 deaths lower than previous estimates. We project that, by the end of 2010, the total number of under-5 deaths worldwide will have dropped to 7.7 million, a 35% reduction since 1990.

Child deaths concentrated in a few regions

Like maternal deaths, under-5 deaths have become increasingly clustered in certain regions. About one in every three deaths of children under 5 occurs in South Asia, and about one in two occurs in sub-Saharan Africa, home to Nigeria and the Democratic Republic of the Congo, two of the countries with the world's highest child mortality rates in 2008. Other regions, such as North Africa and the Middle East, have seen impressive declines. Less than 1% of deaths of children under 5 occur in high-income countries.

Under-5 mortality has declined dramatically during the past two decades in most of North and South America and throughout Asia, Europe, and the Middle East.

Perhaps the most important achievement of the past 20 years is that many countries with the highest child mortality rates are seeing considerable improvement. Because of that, the gap between countries with the highest child mortality rates and the lowest has shrunk significantly, from a difference of 290 in 1990 to 177 in 2008.

Increases in the use of interventions to improve maternal health also appear to be having an effect on child mortality, including increases in the use of skilled birth attendants to help women deliver their babies. Fertility, income, and education levels are also positively impacting child mortality rates to different extents.

Under-5 mortality continues to decline

For the developing world, the under-5 mortality rate has declined 35% from 1990 to 2010, representing an annual rate of decline of 2.1%. This is well below the MDG4 target of 4.4% per year, but still represents substantial progress across nations.

Consider that in 1990, 12 countries had an under-5 mortality rate of more than 200 deaths per 1,000 live births. Today, no country has an under-5 mortality rate that high, according to IHME estimates.

In high-income countries, which make up less than 1% of all child deaths, there remain stark differences. The

United States, for example, ranks 42nd in the world for its 2008 under-5 mortality rate – a rate that is higher than in most of Europe, including in countries with far weaker economies such as Croatia and Hungary. Kuwait had an under-5 mortality rate in 2008 that was three times that of a group of countries with the lowest rate, including Singapore and Finland.

Some of the countries with the highest rates of under-5 mortality have been able to make remarkable progress since 1990. In Ethiopia, the under-5 mortality rate in 1990 was 202 per 1,000 live births. By 2008, that rate dropped by nearly half to 106 per 1,000.

By contrast, Nigeria had an under-5 mortality rate in 1990 of 194 per 1,000, which was slightly better than Ethiopia’s rate of 202. However, Nigeria’s rate has been mostly stagnant with some periods of progress since then. In 2008, its under-5 mortality rate was 160 per 1,000, making it one of the highest rates in Africa.

Figure 8:
Global child mortality trends, 1990 to 2008

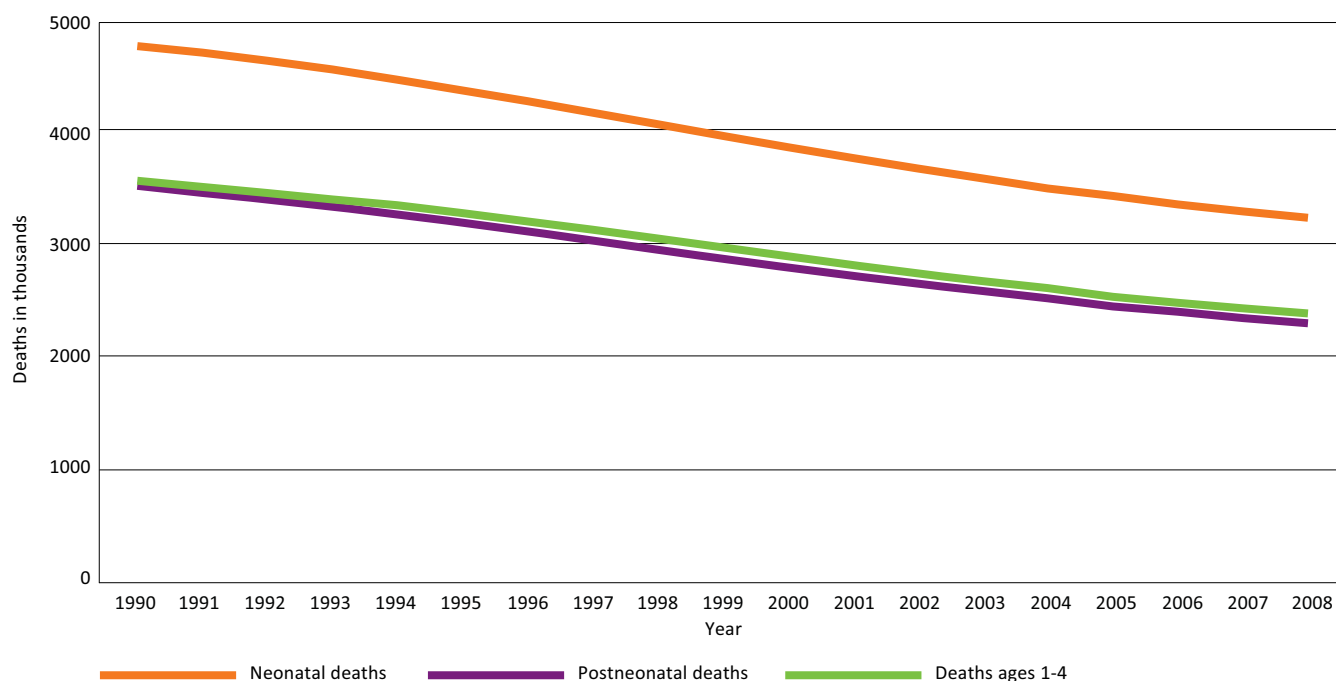
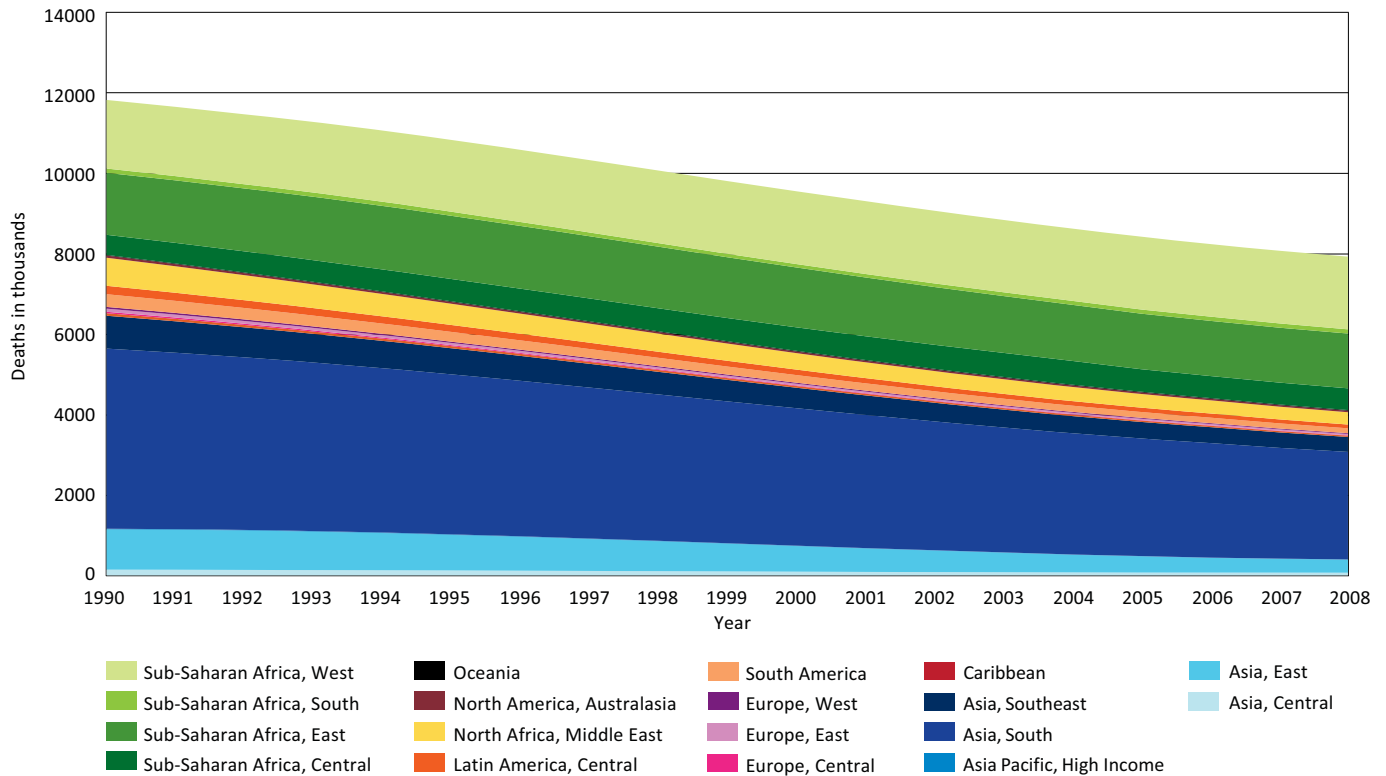


Figure 9:
Under-5 deaths by region, 1990 to 2008



Many countries with the highest under-5 mortality rates are countries in sub-Saharan Africa that also have a high incidence of malaria. To some extent, their varied progress in reducing child mortality tracks with the scale-up in interventions to combat malaria in those countries. HIV also may play a role but, in both cases, further research is needed.

Accelerated progress is possible

Between 1990 and 2008, 75 countries decreased their under-5 mortality rates by 50% or more. This is an important achievement, but the trend is not surprising given rising income and education levels.

More significant is the fact that, based on IHME's estimates, 67 countries have decreased their under-5 mortality rates by more than 30% in just five years during the period of this study.

Since 2000, 13 regions of the world have accelerated their rates of decline in under-5 mortality. The accel-

ated pace of improvement is particularly noteworthy in East Asia, Central Asia, Eastern Europe, and sub-Saharan Africa.

Between 1990 and 2000, sub-Saharan Africa lagged most other regions in the pace of decline in under-5 mortality. Some countries witnessed stagnation or even increases. Since 2000, though, there is clear evidence that progress is picking up in all regions of sub-Saharan Africa.

Since 2000, rates of decline have increased by more than 1 percentage point in Angola, Botswana, Cameroon, Congo, the Democratic Republic of the Congo, Gambia, Kenya, Lesotho, Liberia, Malawi, Mali, Rwanda, Senegal, Sierra Leone, and Swaziland.

For example, Rwanda's child mortality rate had been declining slowly at a rate of 0.2% annually between 1990 and 2000, but accelerated to a pace of 5.7% between 2000 and 2008.

Table 3:
Developing countries on track to meet MDG4
 (reduce under-5 mortality rate by 66% between 1990 and 2015)

Country	Annualized rate of decline (%), 1990 to 2008
Maldives	9.3
United Arab Emirates	8.4
Oman	7.0
Vietnam	6.9
Sri Lanka	6.6
Egypt	6.2
Turkmenistan	6.2
Malaysia	5.8
Lebanon	5.8
Tunisia	5.7
El Salvador	5.7
Peru	5.5
Nepal	5.4
Libya	5.3
Syria	5.2
Mongolia	5.1
Chile	5.1
Bhutan	4.9
Armenia	4.9
Algeria	4.9
Cuba	4.9
Brazil	4.9
Thailand	4.8
China	4.8
Bangladesh	4.7
Mexico	4.7
Liberia	4.6
Bahrain	4.6
Honduras	4.5
Turkey	4.5
Nicaragua	4.4

*IHME has found that children between 1 month and 1 year old have seen the **greatest improvements in mortality rates over the past 40 years.** The rate of mortality in this postneonatal period has declined by **62%** between 1970 and 2010, a larger drop than in any other under-5 age group.*

Kenya and Senegal have also seen significant improvements in their annual rates of decline. Between 1990 and 2000, Senegal's child mortality rate was decreasing by 1.7% annually. Kenya's decline was slower during that period, at less than 0.5% annually. But both countries sped up their pace in the following decade: Senegal's rate of decline more than doubled to 3.6% annually, while Kenya's rate of decline accelerated to 2% annually.

Neonatal deaths decline substantially

In 2009, the 64th session of the UN General Assembly noted that there had been little progress in deaths among children in the first month of life. IHME's new estimates show that there has been much more improvement than previously thought.

The annualized global decline from 1990 to 2010 in neonatal mortality is 2.1% – the same pace as overall under-5 mortality. The longer-term trend is more dramatic. The rate has dropped by more than half from 53 per 1,000 in 1970 to 23 per 1,000 in 2010.

However, postneonatal deaths and deaths of children between 1 year and 5 years of age are declining at a slightly faster pace. Thus, neonatal deaths now make up a larger share of total under-5 deaths: 41% for 2010.

Changes in the pace of decline in the neonatal mortality rate can have a big impact on the broader under-5 mortality rate.

Italy had an under-5 mortality rate of 10 per 1,000 in 1990, decreasing to 4 per 1,000 in 2008. Australia had a rate similar to Italy's in 1990, but it only decreased to 5 per 1,000. The key difference is that neonatal mortality

decreased by about 63% in Italy during that period while, in Australia, neonatal mortality decreased by about 50%. Greece and New Zealand followed a similar pattern. Greece had an under-5 mortality rate of 11 in 1990, decreasing to 4 in 2008. New Zealand had an identical rate in 1990, but it only decreased to 6 by 2008, with Greece's steeper decline driven by a sharp drop in its neonatal mortality rate.

One of the key reasons countries have more difficulty reducing the number of neonatal deaths is that treating infants in the first month of life is much more costly than treating older children. Saving a neonatal child requires expensive technology, highly skilled medical care, and longer hospital stays. As a child matures, he or she usually needs less-expensive health care interventions, such as immunizations, nutritional programs, and annual check-ups.

Despite these challenges, the fact that so many low-resource countries have been able to show substantial declines in neonatal mortality illustrates that even greater progress is possible.

The first year of life improves each decade

Special attention is often paid to the first year of a child's life because infants are particularly vulnerable and because so many deaths occur in this phase.

IHME has found that children between 1 month and 1 year old have seen the greatest improvements in mortality rates over the past 40 years. The mortality rate in this postneonatal period has declined by 62% between 1970 and 2010, a larger drop than in any other under-5 age group.

Figure 10:
Annualized rate of decline in under-5 mortality by country, 1990 to 2008

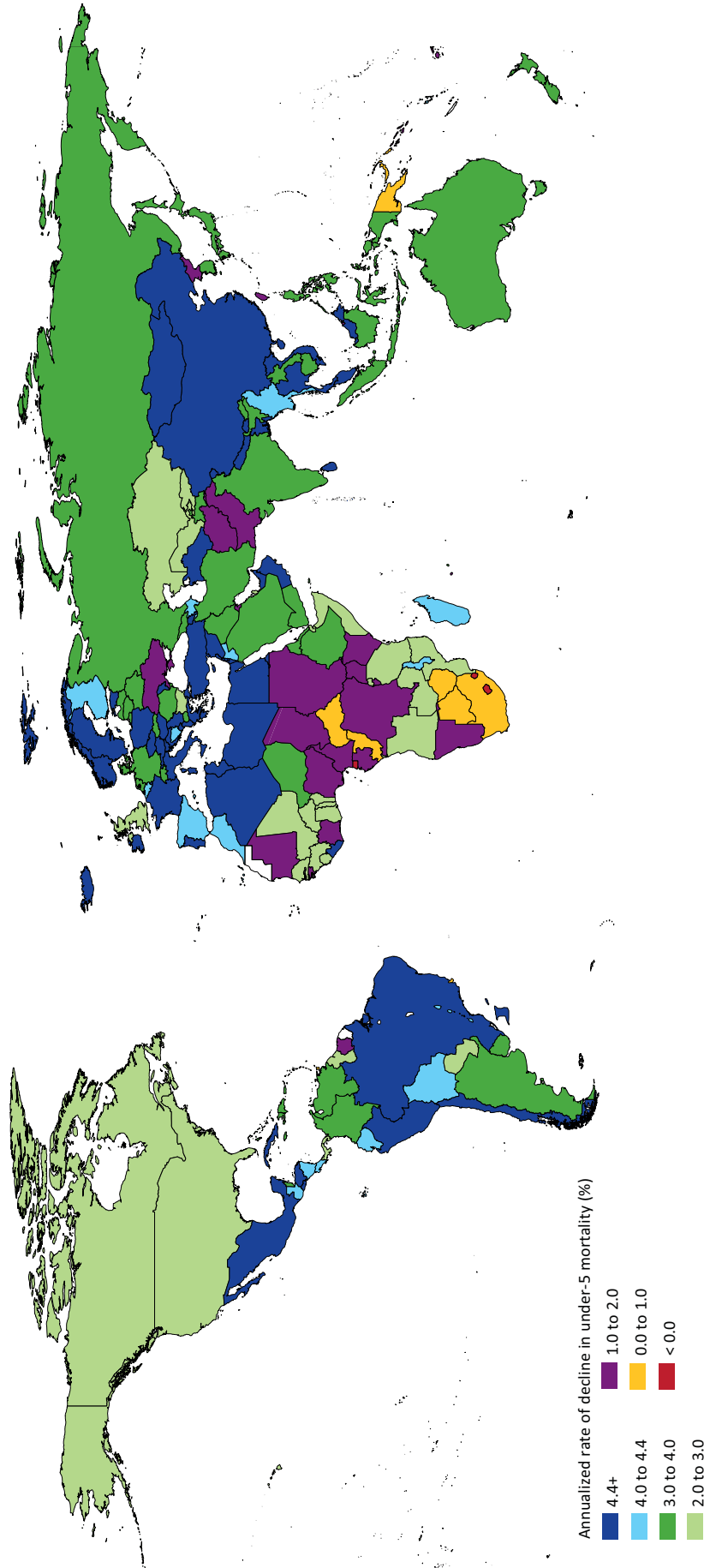


Figure 11:
Under-5 mortality rate by country (per 1,000 live births), 2008

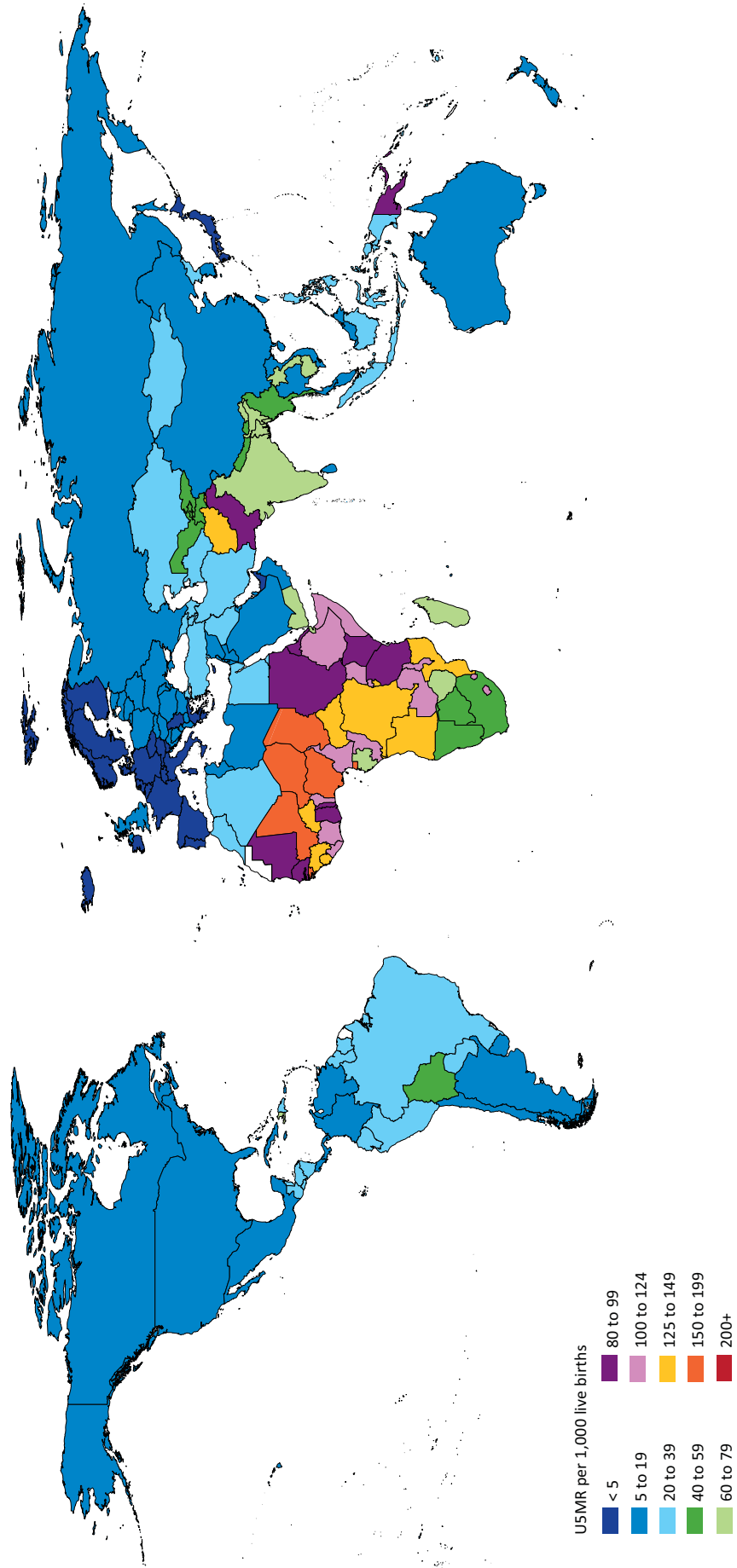


Table 4:
Countries with the most under-5 deaths, 2008

Country	Under-5 deaths (in thousands)	Neonatal deaths (in thousands)	Postneonatal deaths (in thousands)	Births, % of global total	Under-5 deaths, % of global total
India	1,827.7	967.1	454.0	19.7	23.0
Nigeria	956.5	252.0	239.2	4.4	12.0
Pakistan	443.0	233.2	129.9	3.9	5.6
Congo, Democratic Republic of the	388.2	95.5	135.8	2.1	4.9
Ethiopia	330.5	112.7	106.3	2.3	4.2
China	307.1	186.8	92.7	13.3	3.9
Bangladesh	214.5	114.3	53.3	2.5	2.7
Tanzania	174.0	50.6	65.0	1.3	2.2
Uganda	173.1	47.8	59.0	1.1	2.2
Indonesia	168.2	78.5	56.2	3.1	2.1
Afghanistan	158.0	72.9	44.0	0.9	2.0
Niger	129.0	25.7	34.6	0.6	1.6
Kenya	127.8	39.9	47.2	1.1	1.6
Sudan	122.7	39.9	31.4	0.9	1.5
Mozambique	119.2	34.5	49.2	0.6	1.5
Angola	112.0	29.9	37.9	0.6	1.4
Burkina Faso	97.5	23.5	28.1	0.5	1.2
Mali	91.2	26.4	22.7	0.4	1.1
Chad	84.9	21.1	26.1	0.4	1.1
Cameroon	82.6	24.4	23.6	0.5	1.0
All other countries (167)	1,842.8	751.4	605.1	39.7	23.2
Total:	7,950.6	3,228.1	2,341.4	100.0	100.0

IHME also found that, even within the same country, different age groups can have greatly different paces of change in mortality, underscoring the importance of crafting policies that address the different stages of childhood. Mauritius experienced a large gap between the pace of progress in under-5 mortality compared to postneonatal mortality. Its under-5 mortality rate dropped 3.1% annually from 1990 to 2008, while postneonatal mortality dropped even more steeply at 4.3%. In Argentina, the under-5 mortality rate dropped 3.9% between 1990 and 2008, while the postneonatal mortality rate declined 5.2%. Egypt’s under-5 mortality rate declined 6.2% annually in the same period, while postneonatal mortality dropped 7.2%.

Similarly, there are differences in paces of change in neonatal and postneonatal mortality rates in some countries. Between 1990 and 2008, Egypt saw one of the sharpest declines in under-5 mortality. Its postneonatal mortality rate dropped 73% between 1990 and 2008,

while its neonatal mortality rate dropped 52%. In Turkey, postneonatal mortality declined 64% in that same period, while neonatal mortality went down 42%.

Lessons learned:

- Even in countries that have been slow to make improvements in child mortality, it is possible to alter the course of the trend in a short time span.
- Concentrating on the brief neonatal period can have a marked impact on broader under-5 mortality trends.
- Within the same country, different age brackets can have sharply different trends.
- Differences in mortality estimates among various studies highlight the importance of continually updating and refining child mortality measurements. IHME is making its methods for calculating mortality and a series of training tools publicly available on its website to assist developing countries in generating more accurate estimates of child mortality.

Figure 12:
Annualized rate of decline in under-5 mortality:
Kenya, Senegal, and sub-Saharan Africa, 1990 to 2008

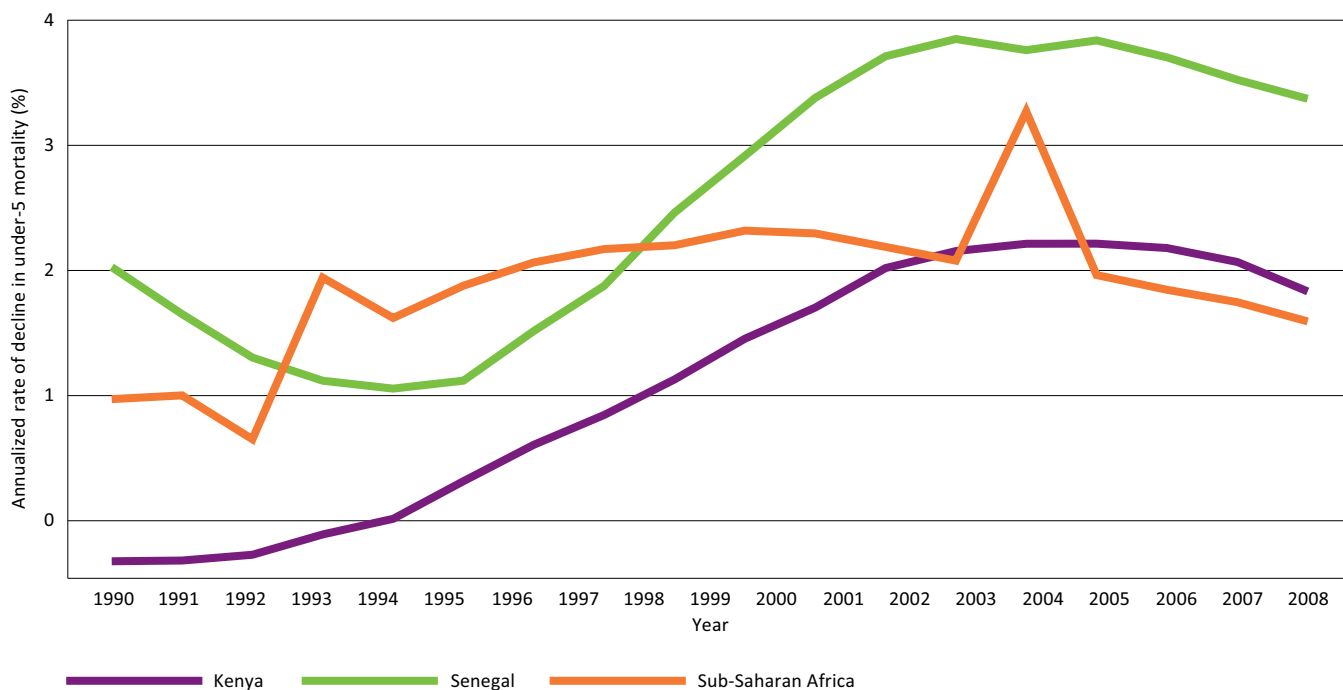


Figure 13:
Declines in under-5 and neonatal mortality in
Australia, Greece, Italy, and New Zealand, 1990 to 2008

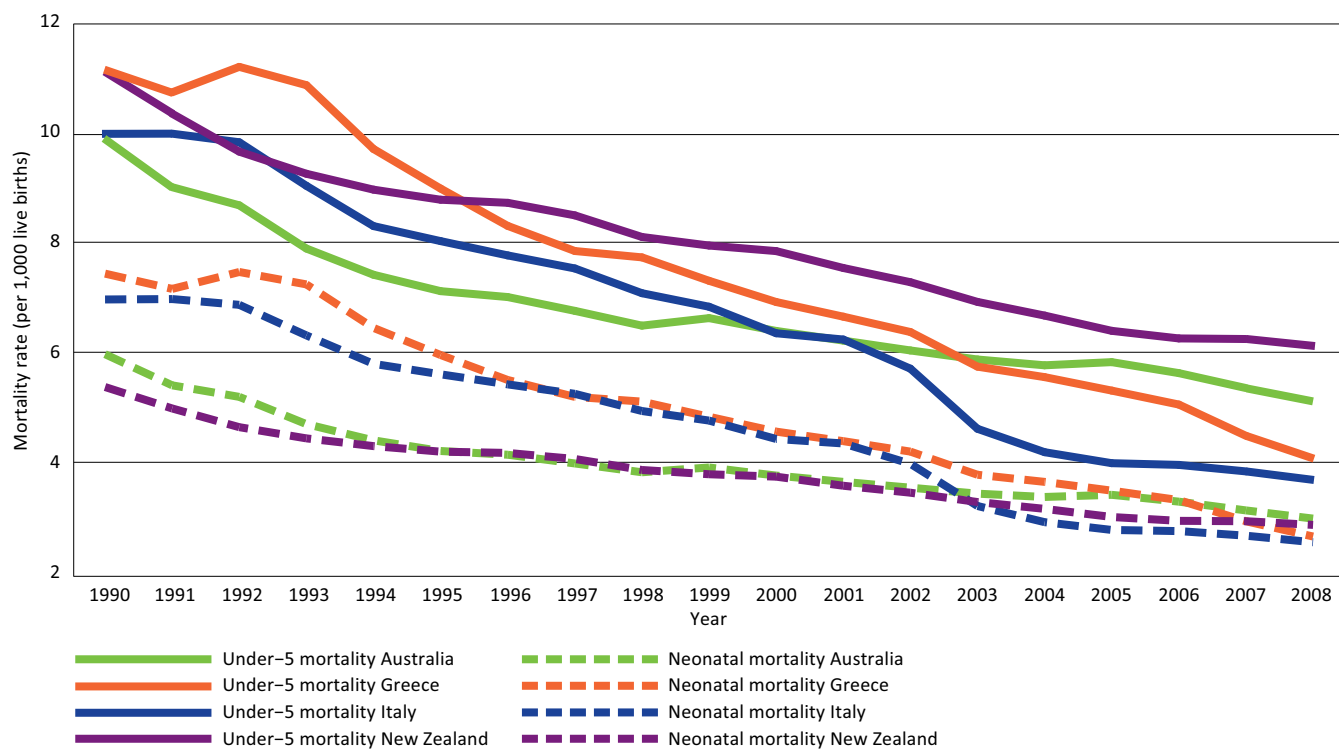


Figure 14:
Neonatal, postneonatal, and under-5 mortality in
Argentina, Egypt, and Mauritius, 1990 to 2008

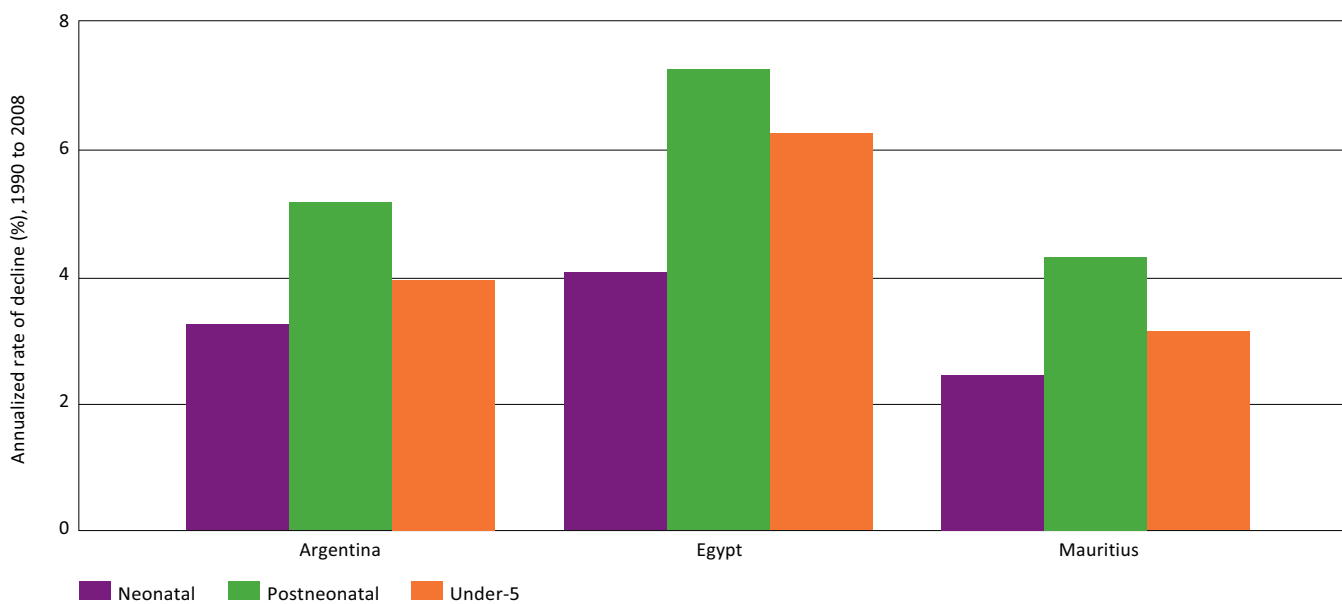


Table 5:
Annualized decline in under-5 mortality rate by country
in sub-Saharan Africa, 1990 to 2000 vs. 2000 to 2008

Country	Annualized % decline in under-5 mortality rate, 1990 to 2000	Annualized % decline in under-5 mortality rate, 2000 to 2008
Angola	2.0	3.8
Benin	2.5	3.2
Botswana	-0.8	1.6
Burkina Faso	1.7	2.7
Burundi	1.6	1.4
Cameroon	0.2	2.2
Cape Verde	2.5	3.3
Central African Republic	0.7	1.1
Chad	1.1	1.1
Comoros	3.3	3.1
Congo	-0.5	0.7
Congo, Democratic Republic of the	1.0	2.5
Côte d'Ivoire	1.5	1.8
Djibouti	2.1	3.1
Equatorial Guinea	-0.1	0.0
Eritrea	3.5	2.5
Ethiopia	3.9	3.2
Gabon	1.2	2.0
Gambia	1.9	4.3
Ghana	2.2	2.4
Guinea	2.6	2.8
Guinea-Bissau	2.0	1.9
Kenya	0.3	2.1
Lesotho	-1.0	0.6
Liberia	3.1	6.5
Madagascar	4.1	4.2
Malawi	3.5	4.8
Mali	1.8	2.9
Mauritania	1.2	1.5
Mozambique	3.3	2.4
Namibia	1.5	1.1
Niger	2.8	3.6
Nigeria	0.9	1.3
Rwanda	0.2	5.7
Sao Tome and Principe	3.8	2.3
Senegal	1.7	3.6
Sierra Leone	2.0	3.6
Somalia	1.8	2.7
South Africa	4.3	-5.0
Sudan	1.3	1.2
Swaziland	-3.0	-0.9
Tanzania	1.9	3.0
Togo	2.2	2.2
Uganda	1.7	2.0
Zambia	1.9	2.3
Zimbabwe	-0.1	0.2